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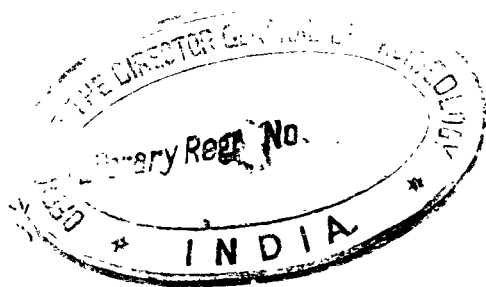
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THE

# JOURNAL

OF THE

ROYAL GEOGRAPHICAL SOCIETY

OF

LONDON.

910.5

J.R.G.S.

VOLUME THE EIGHTEENTH.

1848.

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## ILLUSTRATIONS.

Part of Western Australia.

Part of a Terrestrial Globe.

Part of Eastern Africa.

Diagram illustrative of the Fall of Rivers.

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# Royal Geographical Society.

1848.

## REPORT OF THE COUNCIL,

READ AT THE ANNIVERSARY MEETING, 22ND MAY.

THE Council have to report that, since the last Anniversary Meeting, there have been elected 8 new Members. Within the same period there have occurred 53 vacancies, of which 21 are by death and 32 by resignation, and the Society now consists of 344 Compounders and 283 Subscribers, besides 39 Honorary and 22 Corresponding Members.

*Finance.*—The accompanying balance-sheet, made up to the 31st of December, 1847, shows a balance in favour of the Society of 144*l.* 2*s.* 4½*d.*, but there remained unpaid at that date debts amounting to 293*l.* 17*s.* 10*d.*, all of which have, with the exception of one for printing, been subsequently discharged.

*Journal.*—The Journal during the past year has been published with regularity and distributed to the Fellows free of charge. Although the size of the volume has been reduced, in compliance with the resolutions of the Society adopted last year, the Council have the satisfaction of stating that nothing of importance has been omitted.

*Arrears.*—The arrears of subscriptions owing to the Society on the 1st of January last, amounted to 422*l.*, a small portion only of which has been since received; this is to be attributed to the circumstance of the majority of those in arrear being out of the kingdom.

*Royal Donation.*—Of the two gold medals forming the donation of Her Most Gracious Majesty, that called the Patron's

Medal has been awarded to Sir James Brooke (Rajah of Sarawak) for his expedition to Borneo, undertaken at his own risk and expense, with great judgment and after much preparation, as well as for the zeal and perseverance which he has shown during his long residence in Borneo and Celebes, in promoting the progress of geographical discovery directly by his own exertions, and indirectly by the extension of civilization, and the substitution of commerce for lawlessness and piracy; and that called the Founder's Medal to Captain Charles Wilkes, U.S.N., for the talent and perseverance he displayed in a voyage of four years for discovery in the Southern Hemisphere and in the Antarctic regions, the results of which he has given in a splendid and scientific work, published by the Government of the United States.

*Library.*—The Council having maturely considered the state of the library, as well as that of the large and valuable collection of maps and charts belonging to the Society, alluded to in the report of the Council last year, appointed a Committee to examine and report what measures should be adopted for the purpose of preserving the same and rendering them more accessible to the Fellows generally. That Committee carefully inspected the whole, obtained estimates for binding the unbound volumes, as well as for mounting the maps and charts, and for adding to the library the necessary accommodation by an increased number of shelves. The report of the Committee, having been adopted by the Council, has been circulated amongst the members of the Society, and subscriptions for effecting the proposed measures have been forwarded to the amount of 225*l*. An additional sum, however, of nearly 100*l*. will be required to complete the proposed measures. The Council have resolved to keep this fund separate from the general fund of the Society; if therefore a larger amount should be received than is required at present, it will be retained for this specific purpose.

*Accessions.*—The accessions to the library during the past year consist of 232 books and pamphlets, and 292 maps and charts, amongst which the Council wish particularly to notice 117 from the *Dépôt de la Marine* at Paris, many of which are of great value and interest.

In conclusion, the Council have to regret the diminution in the number of members within the past year, but they would observe that circumstances of an unusual character have tended to swell the list; the great commercial distress, affecting the interests of so large a portion of the community, has led to several resignations, and this will, perhaps, be found to apply not exclusively to the Royal Geographical Society, but to scientific bodies generally. Notwithstanding these circumstances the Council look forward with confidence to a more propitious future, and trust that, by the exercise of proper economy, the funds of the Society will be rendered adequate to its expenditure, and that by the addition of new members it will continue to maintain that high and important position which its objects so justly entitle it to claim.

---



# ESTIMATE FOR THE YEAR 1848.

## Receipts.

|   |  | The following Accounts remained unsettled Jan. 1, 1848:— |       | <i>Expenditure.</i> |           |
|---|--|--|-------|---------------------|-----------|
|   |  | £.   | s. d. | £.                  | s. d.     |
| Balance at the Banker's, 1st of January, 1848 |  | 136  | 16 7  |                     | 8 17 3    |
| Ditto Petty Cash                              |  | 7  | 5 9   |                     | 13 10 0   |
| Rent owing by the Borneo Mission              |  | 15   | 0 0   |                     | 19 19 6   |
|   |  |  |       |                     | 65 18 3   |
|   |  |  |       |                     | 21 0 0    |
|   |  |  |       |                     | 103 17 10 |
|   |  |  |       |                     | 1 1 0     |
|   |  |  |       |                     | 44 11 6   |
|   |  |  |       |                     | 15 0 0    |
|   |  |  |       |                     | 293 17 10 |
|   |  |  |       |                     | 159 2 4   |

|   |  | Balance in hand and owing to the Society |       | Balance owing by the Society |          |
|---|--|--|-------|------------------------------|----------|
|   |  | £.                                       | s. d. | £.                           | s. d.    |
| Entrance of 16 new Members at 3 <i>l</i> .                                  |  | 48                                       | 0 0   |                              | 134 15 6 |
| Subscriptions of 283 Members at 2 <i>l</i> .                                |  | 566                                      | 0 0   |                              | 134 15 6 |
| Arrears   |  | 50                                       | 0 0   |                              | 263 13 0 |
| Dividends on 2278 <i>l</i> . 4 <i>s</i> . 4 <i>d</i> . 3 <i>¼</i> per Cent. |  | 71                                       | 17 8  |                              | 261 0 0  |
| Ditto on 224 <i>l</i> . 1 <i>s</i> . 10 <i>d</i> . 3 per Cent. Consols      |  | 6  | 10 6  |                              | 70 0 0   |
| Royal Premium   |  | 52                                       | 10 0  |                              | 5 0 0    |
| By sale of Journals   |  | 25                                       | 0 0   |                              | 5 0 0    |
| Borneo Church Mission   |  | 30                                       | 0 0   |                              | 150 0 0  |
| Estimated deficiency  |  | 105                                      | 1 10  |                              | 10 0 0   |
|   |  |  |       |                              | 5 0 0    |
|   |  |  |       |                              | 46 10 0  |
|   |  |  |       |                              | 4 1 6    |
|   |  |  |       |                              | £955 0 0 |

WILLIAM HUMBLE.



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- 
- 1831.—Mr. RICHARD LANDER, for the discovery of the course of the River Niger or Quorra, and its outlet in the Gulf of Benin, in Central Africa.
- 1832.—Mr. JOHN BISCOE, for the discovery of the land now named "Enderby's Land" and "Graham's Land," in the Antarctic Ocean.
- 1833.—Captain Sir JOHN ROSS, R.N., for discovery in the Arctic Regions of America.
- 1834.—Major Sir A. BURNES, C.B., F.R.S., for the navigation of the River Indus, and a journey by Balkh and Bokhara across Central Asia.
- 1835.—Captain Sir GEORGE BACK, R.N., for the discovery of the Great Fish River, and navigating it to the sea on the Arctic Coast of America.
- 1836.—Captain ROBERT FITZROY, R.N., for the survey of the shores of Patagonia, Chile, and Peru, in South America.
- 1837.—Colonel CHESNEY, R.A., F.R.S., for the general conduct of the "Euphrates Expedition" in 1835-6, and for the accessions to comparative and physical geography relating to the countries of Northern Syria, Mesopotamia, and the Delta of Susiana.
- 1838.—Mr. THOMAS SIMPSON, [Founder's Medal,] for the discovery and tracing, in 1837 and 1838, of about 300 miles of the Arctic shores of America.
- Dr. EDWARD RÜPPELL, [Patron's Medal,] for his travels and researches in Nubia, Kordofán, Arabia, and Abyssinia.
- 1839.—Mr. R. H. SCHOMBURGK, [Patron's Medal,] for his travels and researches during the years 1835-9 in the colony of British Guayana, and in the adjacent parts of South America.
- Major H. C. RAWLINSON, E.I.C., [Founder's Medal,] for his travels and researches in Susiana and Persian Kurdistan, and for the light thrown by him on the comparative geography of Western Asia.

- 1840.—Lieut. RAPER, R.N., [Founder's Medal,] for the publication of his work on "Navigation and Nautical Astronomy."
- Lieut. JOHN WOOD, I.N., [Patron's Medal,] for his survey of the Indus, and re-discovery of the source of the River Oxus.
- 1841.—Captain JAMES CLARK ROSS, R.N., [Founder's Medal,] for his discoveries in the Antarctic Ocean.
- Rev. Dr. E. ROBINSON, of New York, [Patron's Medal,] for his work entitled "Biblical Researches in Palestine."
- 1842.—Mr. EDWARD JOHN EYRE, [Founder's Medal,] for his explorations in Australia.
- Lieut. J. F. A. SYMONDS, [Patron's Medal,] for his survey in Palestine and levels across the country to the Dead Sea.
- 1843.—Mr. W. J. HAMILTON, M.P., [Founder's Medal,] for his researches in Asia Minor.
- Prof. ADOLPH ERMANN, [Patron's Medal,] for his extensive geographical labours.
- 1844.—M. CHARLES RITTER, [Gold Medal,] for his important geographical works.
- Dr. BEKE, [Founder's Medal,] for his extensive explorations in Abyssinia.
- 1845.—Count P. E. DE STRZELECKI, [Founder's Medal,] for his extensive explorations and discoveries in the South-Eastern portion of Australia, and in Van Diemen's Land; and for his valuable work, in which he has consigned the results of his observations.
- Professor A. TH. MIDDENDORFF, [Patron's Medal,] for his extensive explorations and discoveries in Northern and Eastern Siberia.
- 1846.—Captain CHARLES STURT, [Founder's Medal,] for his various and extensive explorations in Australia.
- Dr. LUDWIG LEICHHARDT, [Patron's Medal,] for a journey performed from Morton Bay to Port Essington.
- 1847.—Captain CHARLES WILKES, U.S.N., [Founder's Medal,] for his Voyage of Discovery in the S. Hemisphere and in the Antarctic Regions, in the years 1838–42, and for the volumes which he has published, detailing the narrative of that expedition.
- Sir JAMES BROOKE, Rajah of Sarawak and Governor of Labuan, [Patron's Medal,] for his Expedition to Borneo.
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# PRESENTATION

## OF THE

### G O L D M E D A L S,

AWARDED RESPECTIVELY TO CAPTAIN WILKES, U.S.N., AND  
SIR JAMES BROOKE.

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THE President, Mr. W. J. Hamilton, thus addressed the Meeting:—

“Gentlemen,—You have just heard the announcement that the Council has awarded the Founder’s Medal to Captain Wilkes, of the United States Navy, for the zeal and intelligence with which he carried out the scientific exploring expedition intrusted to him by the Government of the United States in the years 1838–1842; and for the volumes which he has published, detailing the narrative of that expedition.

“It therefore becomes my duty to endeavour to give you some account of the performances of the gallant officer, and of the services which he has rendered to the progress of geography. It must be remembered that this was the first expedition ever fitted out by the Government of the United States for scientific purposes. Greater difficulties must, therefore, be supposed to have attended its organization than would have been the case with more experience; on the other hand, the merit of success is proportionally increased.

“The expedition left the Hampton Roads on the 17th of August, 1838, and its first scientific operation was the establishment of an observatory at Orange Harbour, in Terra del Fuego; here some of the vessels remained while others were detached to the westward, and Captain Wilkes himself proceeded on the 25th of February to the S., for the purpose of exploring the S.E. side of Palmer’s Land. After reaching lat. 63° 25’ S., finding the season too far advanced to make any progress against the ice, he turned his ship’s head to the N., and the whole squadron was soon collected at Valparaiso. Here another observatory was established. A scientific party visited the bank of snow from which the city is supplied, on one of the outlying ranges of the Cordilleras, the principal heights of which rose nearly 4000 feet above them; others visited the mines of Chili. They then proceeded to the coasts of Peru, and thence, after a visit to the interior and to the ruins of Pachacamac, commenced their explorations in the Pacific.

“The Paumotu group of islands was first visited, for the purpose of completing its examination as recommended by Admiral Krusenstern,

and in the hope of settling the disputed point between the two distinguished English and French navigators, Captains Beechey and Duperrey, as to the geographical position of the island of Minerva or Clermont de Tonnerre; Captain Wilkes considers the statement of Captain Duperrey the most correct. After visiting Tahiti and the Samoan Group, respecting all of which Captain Wilkes' details are full of information, he proceeded to Sydney to refit before starting on his Antarctic cruise.

"On the 26th of December, 1839, they left Sydney, and first fell in with the ice on the 10th of January, 1840, in lat.  $61^{\circ} 8' S.$ , and long.  $162^{\circ} 32' E.$ ; and on the 11th some of the officers were confident they saw indications of land. Captain Wilkes does not rely much on this; but on the 16th these appearances became more positive, and on the 19th they distinctly saw land in long.  $154^{\circ} 30' E.$ , lat.  $66^{\circ} 29' S.$  Captain Wilkes, however, only dates the discovery which he claims for his expedition from the land seen on the 16th. I mention this the more anxiously on this occasion, on account of the controversy which has arisen between him and Sir James Ross, who sailed over the spot where land was supposed to have been seen on the 11th; to this, however, I wish to allude as lightly as possible, convinced as I am that both these gallant officers have only been anxious to establish the truth, and to advance the cause of science. Undoubtedly, on the tracing which Captain Wilkes furnished to Sir James Ross, the land supposed to have been seen on the 11th of January is sketched in, and, as a measure of precaution, it was perhaps prudent in Captain Wilkes so to do; it would have been more satisfactory if he could have stated to Sir James Ross, as he has done in his published account, on what slight and imperfect evidence its existence in that position was laid down. After continuing his explorations of the Antarctic continent as far to the westward as long.  $97^{\circ} E.$ , Captain Wilkes, finding his provisions short, and the season far advanced, turned his ship's head to the N. and quitted these frozen latitudes. I cannot take leave of this portion of the narrative of Captain Wilkes without alluding to the high encomiums passed on his proceedings by Sir James Ross, who observes that 'the arduous and persevering exertions of this expedition, continued throughout a period of more than six weeks under circumstances of great peril and hardship, cannot fail to reflect the highest credit on those engaged in the enterprise, and excite the admiration of all who are in the smallest degree acquainted with the laborious and difficult nature of an icy navigation;' he adds, 'that as yet they had not received the reward or approbation they merited.'

"But I cannot dwell longer on the details of this interesting expedition. They subsequently proceeded to New Zealand, thence to the Feejee group of islands, where an observatory was established on Ovalau, and many interesting facts ascertained respecting the habits and manners of the natives, and the geographical features of the group. Hence they proceeded to examine the Hawaiian group, or Sandwich Islands, where we have an interesting account of the ascent of Mauna Loa and the Volcano of Kilauea. Thence stretching across to the American continent, they surveyed a portion of the coast of

California. Again crossing the whole extent of the Pacific, they visited and examined the Philippine Islands; and passing through the Sooloo Archipelago, proceeded to Singapore, and finally returned to America, touching at the Cape of Good Hope. I regret that it is impossible, within the limits of this address, to do justice to the contents of the five volumes in which Captain Wilkes has described the progress of the expedition; but I trust I have done enough to show that the exertions of Captain Wilkes, and the result of the expedition intrusted to him, have in every respect been such as to entitle him to the highest mark of distinction which it is in the power of this Society to bestow."

The President, now addressing himself to Mr. Bancroft, said—

"MR. BANCROFT,—In addressing you for the purpose of placing in your hands the medal which has been awarded by the Council of the Royal Geographical Society of London to your distinguished countryman, Captain Wilkes, for the valuable work which he has published under the title of the 'United States Exploring Expedition,' I rejoice in being the organ of expressing to you the sentiments entertained on this side of the Atlantic of the merits of Captain Wilkes. This is the second occasion on which our medal has been awarded to one of our Transatlantic brothers, and I feel no small gratification in being thus enabled to give to the whole civilized world this additional proof that the pursuit of science operates as a powerful inducement in knitting the bonds of friendship still more closely together between the two great nations of the Anglo-Saxon race. May this union long exist, and may they in their continued harmony and good-fellowship continue to point out by their enlightened institutions the value of that sound practical common sense for which they are both so pre-eminently distinguished. May I request you to convey this medal to Captain Wilkes, with the expression of the best wishes of the Royal Geographical Society of London for his future prosperity and success."

The American Minister replied as follows:—

"MR. PRESIDENT,—I have the greatest satisfaction in receiving on behalf of Commander Wilkes, of the United States Navy, the Founder's Medal awarded to him by the Royal Geographical Society. An Englishman discovered North America, and England has made the paths of the wilderness as familiar as accustomed haunts, and traced the currents of the ocean almost as carefully as the courses of her rivers. To obtain, therefore, from the body representing English geographical science this most honourable testimonial to the merits of an American expedition, is in every way grateful.

"Let me add my thanks for the affectionate words in regard to my country in its relation with your own. Every kindly wish of that nature uttered here has its response beyond the Atlantic; and on this occasion I will express the hope, that when the remote regions which our navigators have revealed or explored become enlivened by the colonies of civilized man, when the great ocean which so long remained

a solitude is rendered social by the peaceful fleets of commerce, your countrymen and mine may never meet but in friendship.

"I shall immediately transmit this medal to Commander Wilkes, who graces a patriotic zeal in his profession by the successful culture of science."

#### PATRON'S MEDAL.

The President then proceeding, observed—

"It has already been announced that the Council have awarded the Patron's Gold Medal to Sir James Brooke, the Rajah of Sarawak and Governor of Labuan.

"The name of Mr. Brooke has been so frequently and honourably brought before the public in the course of the past winter, that it is almost unnecessary for me to occupy your time in detailing at any length the motives which have led the Council to make their present award. But I should be failing in my duty to this Society, to my distinguished friend, and, lastly, to myself, were I on the present occasion to omit all mention of the honourable and gallant deeds of our absent associate. When a very young man Mr. Brooke went to India as a cadet, and was distinguished for his gallantry in the Burmese war. Being wounded on that occasion, he left Calcutta for China in 1830, for the benefit of his health. During this voyage he first saw and was struck with the islands of the Asiatic Archipelago. Although hitherto neglected and scarcely known, Mr. Brooke soon became convinced that they offered a splendid field for enterprise and research. Henceforth, to carry civilization to the Malay races, to extend to them the benefits of commerce, and to open to us additional geographical knowledge, became the objects to which he determined to devote his energies and his means. Soon after his return to Calcutta he quitted the Indian service, and, full of zeal for his contemplated work, proceeded to England, working his way home before the mast, in order to acquire a practical knowledge of those duties and of that science to which henceforth he must trust so much.

"He then became the owner of the Royalist yacht, and spent a twelvemonth cruising in the Mediterranean, trying his vessel and training his crew. During this time he prepared a short memoir on the Gulf of Syme, not yet surveyed by our Navy, and which was published in the eighth volume of our Journal.

"He sailed from England on his gallant yet hazardous adventure on the 27th of October, 1838, and on the 1st of August, 1839, dropped his anchor off the coast of Borneo, near Tanjong Api. After visiting Sarawak, exploring some of the rivers along the coast, and putting himself in communication with the Rajah, Muda Hassim, during which time he had become deeply interested in the future fortunes of Sarawak, Mr. Brooke returned to Singapore, and determined on an excursion to Celebes during the probable continuance of the civil war in Borneo. To this visit to Celebes we are indebted for much information respecting the geography of the Gulf of Boni, a chart of which was prepared under the immediate eye of Mr. Brooke, who has also

given us, for the first time, the history of the great independent kingdoms of this fine island, whose princes are said to be desirous of forming commercial relations with the English nation.

“After his return to Sarāwak in August, 1840, struck with the miserable condition of a fine country and a fine people, Mr. Brooke entered into arrangements with the Rajah, Muda Hassim, which terminated in the discomfiture of the rebels, and finally in the cession of Sarāwak to Mr. Brooke, and of the island of Labuan to the British Government. For the details of the gallant enterprises by which these measures were brought about, I must refer you to the interesting volumes of Captain Keppel, and to those still more recently published, in which the full success of Mr. Brooke's plans has been developed, by my gallant friend Captain Mundy.

“In these will be seen the advantages gained to geographical science by the introduction of civilization and commerce amongst the Malays and Dyaks of Borneo. Many of the rivers of that island, admitting our steamers and men-of-war far into the heart of the country, were surveyed and examined, first by Mr. Brooke, and subsequently by the commanders of the different vessels who were induced to visit the coasts of Borneo, either from Mr. Brooke's representations, or in the exercise of duty for the purpose of putting down the lawless system of piracy and murder which had long prevailed on those inhospitable shores. By them the coasts have been still more accurately surveyed and laid down, but to Mr., now Sir J., Brooke will ever remain the credit and the praise of having, from his own energies and resources, evolved a plan of conduct, founded on the most enterprising and philanthropic views, which has led to such a vast increase of our geographical knowledge, and to the introduction of lawful commerce and enlightened civilization in regions hitherto known only by the kris of the Malay and the atrocious narratives of rapine, piracy, and murder.

“Captain MUNDY,—It is with the liveliest satisfaction that I request you to be the means of forwarding this medal to our mutual friend. It recalls to my memory those days when, myself a traveller on the classic shores of Ionia, I first became acquainted with yourself, and subsequently with Mr. Brooke in the Gulf of Smyrna. You will not fail to remind Sir J. Brooke of the warm interest entertained by the Royal Geographical Society for his success, and of the pleasure they have felt in conferring on him this mark of their admiration and esteem.”

Captain Rodney Mundy rising, replied—

“Mr. PRESIDENT,—I can assure you that I receive with great satisfaction the Patron's Gold Medal which has been awarded by the Council of the Royal Geographical Society to Sir James Brooke, and, according to your request, I will take the earliest opportunity of forwarding it to him, either at the seat of his own native government in the province of Sarāwak, or at the seat of the government which he holds under the authority of our Gracious Majesty at the Island of Labuan. And now I should wish at once to convey to you my thanks for the kind and complimentary manner in which you have been

pleased to allude to me individually, when first we became acquainted on the shores of Ionia, and also as connected with Sir James Brooke's exertions in promoting the extension of geographical knowledge in the Indian Archipelago. I also am desirous of expressing how gratified I feel at having been invited to attend here to-day, as the representative of my friend the Rajah of Sarāwak, on this interesting and important occasion.

"It was my good fortune to be much associated with that great man during the last two years of his unequalled career in the East; it was also my good fortune to be selected by Rear-Admiral Sir Thomas Cochrane, the Commander-in-Chief in the Indian Seas, to take possession, in the name of The Queen, of the Island of Labuan, over which Sir James Brooke now rules; an island which, though small and insignificant in itself, yet, from its position at the mouth of the river on which stands the capital of Borneo Proper; from its excellent harbour; from the large vein of coal which it contains in its bosom, and from other local circumstances, will, we may reasonably anticipate, ere many years pass over, form a valuable commercial establishment in that quarter of the globe. From that island, as a general centre, we may also predict that many expeditions will shortly set forth with the grand object of extending our geographical and geological knowledge of the neighbouring countries, and, under the guidance of the master mind of its founder and governor, we may surely look forward to the happiest results, and thus, by imperceptible advances, make ourselves acquainted with much that will be valuable to science in general.

"Mr. President, feeling enthusiastically as I do every thing connected with Sir James Brooke, it is difficult for me to resist the temptation, which the opportunity of speaking now offers me, of dwelling at some length on the many and great services performed by my distinguished friend for the benefit of his country and for the advancement of civilization; but I feel that it would be out of my province to do more on this occasion than express my admiration of the able and correct statement which you have yourself just given of the general character of Sir James Brooke's mission to Celebes and Borneo. As connected with the object for which I am here to-day, I may also state that I was engaged with Sir James Brooke in all those extensive operations which terminated in the total expulsion of the pirate communities from the N.W. coast of Borneo, and which placed the seaboard of that magnificent island in a state of security; the practical result of which has been, that on the same ground where, only two years since, that zealous officer Sir Edward Belcher met with every obstacle, and was obliged to hurry from station to station at the risk of the loss of his instruments and even of his life, there is now not only no opposition from the natives, but even a desire to afford every assistance to the officer employed on surveying duty in that quarter.

"It now only remains for me to add, that in frequent conversations held with Sir James Brooke, I have ever heard him express himself in terms of warmth and anxiety for the extension of geographical knowledge in the Indian Archipelago; indeed, with the exception of the

two leading and animating passions of his mind (if I may so express myself), namely, the gradual civilization of our semi-barbarous brethren in those seas, and the opening of a new field for the commercial enterprise of his own great country, the progress of geographical discovery has been one of the grand ideas which occupied him from the commencement of his hazardous voyage, and which he cherished with the same enthusiasm which has marked every other act of his extraordinary life.

“ You will then, Mr. President, easily comprehend how gratified Sir James Brooke will be when he receives this testimony of the feelings of this distinguished Society towards him. He will, I am assured, receive this valuable token of the estimation in which his services have been held by this Society with every sentiment of gratitude. It will be a proof to him, that although his labours have been carried on at the distance of half the globe, those labours on behalf of science have not been in vain; he will know that the eye of a small but scientific body of his fellow-countrymen has been anxiously watching his proceedings through the many years of his voluntary exile, and, at the proper time and season, have offered to him the greatest reward it is in their power to bestow.

“ This gift will, indeed, be an earnest and still further encouragement to Sir James Brooke to continue those services so long as Providence continues to him the blessing of health, and the Patron's Gold Medal will, I am satisfied, ever remain in his family as a memorial of the honour now conferred on him by the Council of the Royal Geographical Society.”



## ADDRESS

TO THE

ROYAL GEOGRAPHICAL SOCIETY  
OF LONDON;*Delivered at the Anniversary Meeting on the 22nd May, 1848,*

BY W. J. HAMILTON, Esq.,

PRESIDENT.

GENTLEMEN,—In conformity with the practice now for some years established by my predecessors in this Chair, I proceed to lay before you a statement of the progress made in geographical knowledge during the past year. And although it may, perhaps, appear that the results have hardly equalled our expectations, and that the amount of geographical discovery falls short, in some respects at least, of that made during former periods, I think you will agree with me when I say, that much has been done both by our own countrymen and by foreigners to mark the epoch we are now celebrating as one not altogether devoid of interest or novelty, and as one which will add fresh laurels to those who have already distinguished themselves in a career in which they may be justly called the pioneers of an enlightened civilization.

But before proceeding to those matters which form the main feature of my task, I must detain you for a short time, while I refer to those amongst our associates whose loss we have to lament, who have more particularly distinguished themselves by their exertions in the field, or their less active but not less meritorious investigations in the closet.

## OBITUARY.

We have to lament the loss of three distinguished foreign honorary members of our Society—Count Gräberg of Hemsö, Major-General Visconti, and Professor Magnussen of Copenhagen. In the two former we have, I regret to say, lost two of our most valued and useful correspondents. From them we were in the habit of regularly receiving the most correct and detailed information of the progress of

our science, or of whatever related to it, from Florence and from Naples.

Count James Gråberg de Hemsö was born at Gannarfve, in the Swedish island of Gothland, the 7th of May, 1776. After receiving an excellent education from his father, President of the Court of Appeal in Gothland, he entered the merchant service at the age of 16, and visited England, Portugal and America. In the year 1793 he served on board a British man-of-war, and in 1794 commanded a gun-boat at the capture of the fort of Calvi in Corsica. When about to obtain the rank of Lieutenant he was obliged, in consequence of a duel, to leave the service, and retired to Genoa. In 1800 he was attached to the Swedish Legation, in Italy, as Private Secretary to M. de Laggerswärd, and devoted himself to his favourite studies of statistics, mediæval history, ethnography, and philology. He then became Swedish Vice-Consul at Genoa, and in 1815 was appointed Secretary to the Consulate at Tangiers. In 1822 he was compelled to fly from Tangiers, and to take refuge in Gibraltar; in 1823 the King of Sweden named him Consul at Tripoli, but not meeting with the support he expected from his own Government, he obtained permission, in 1828, to retire from his post and to reside in Florence, where he had remained since that period, devoting his time to the pursuit of his favourite studies, amassing a valuable and extensive library, and writing memoirs on the different subjects connected with his studies. A catalogue of his works, published in 1837, thus enumerates 112 distinct performances:—Works printed separately, 27; poetical works, 8; academical memoirs, 15; articles in periodicals and journals, 62. These were written in no less than eight different languages, viz., Italian 76, French 24, English 4, Latin 3, Swedish 2, German, Portuguese, and Arabic, 1 each. Amongst these numerous works I may mention his ‘*Annali di Geografia e di Statistica*,’ full of useful and curious information, and his ‘*Specchio del imperio di Marocco*,’ the result of a residence of six years at Tangiers. Many papers by him are to be found in the ‘*Memoirs of the Geographical Society of Paris*,’ and in the seventh volume of our own *Journal* is an interesting communication from him, with a vocabulary of names of places, &c. in the empire of Marocco.

General Ferdinand Visconti was born at Palermo in 1772. Whilst still at the military college he was arrested and confined, without any accusation, in the dungeons of Pantellaria. Although liberated in 1801, he was obliged to fly to Milan, where he entered the corps of engineers, and rapidly distinguished himself. He was charged by the Emperor Napoleon with the construction of a new large military and

administrative map of Lombardy. The materials placed at his disposal were so imperfect that he was compelled to begin by fixing for himself the latitudes and longitudes of numerous places. In 1810 he accompanied General Danthouard into Tyrol, to fix the boundaries between Bavaria and the kingdom of Italy. In 1814 he returned to Naples, where he was placed at the head of the Bureau Topographique, which he soon placed on a sound scientific footing, and on the return of Ferdinand IV. from Sicily was confirmed in his office. In 1820 he was nominated by the Hereditary Prince to the Provisional Junta of the Constitutional Government. On the return of the King with the Austrians, he resumed his office of Director of the Bureau Topographique, but was dismissed in 1822, being subsequently restored in 1826, after several years' residence in France and other countries. His principal works were the map of the kingdom of Italy, already mentioned, in 7 sheets, a hydrographical map of the Adriatic in 22 sheets (a work of great merit), and subsequently the topographical map of the environs of Naples, besides several others commenced before he was dismissed in 1822.

Professor Magnussen, of Copenhagen, was well known as the President for many years of the Society of Northern Antiquaries.

Amongst our own countrymen our losses have been unusually numerous. Even within the last few days we have to lament the loss of Lord Ashburton, who, although not distinguished as a geographical writer, will ever be remembered for having settled the most important geographical question of modern days—a question respecting which every public and private depository of maps and charts was ransacked for information, and on the solution of which the peace of nations was at one time supposed to hang. I need not say that I allude to the question of the boundary between the Canadian possessions of Great Britain and the United States.

We have also to deplore the loss of the Earl of Powis, the Marquess of Bute, Admiral Sir Robert Stopford, Sir James Annesley, Colonel Barnewell, Colonel Brandreth, a member of the Council of this Society, Captain Shirreff, and many others.

Amongst the really practical men of whose services we have been deprived, I must particularly notice Lieut.-Colonel Henry R. Brandreth, who had only recently been elected a member of our Council. He was born in 1794, and, after receiving an excellent military education, was employed, on receiving his commission, in the Engineers at Chatham, and in the survey of England. He was afterwards actively employed on foreign service for many years. In 1825 he was appointed by the Duke of Wellington to erect iron barracks in some of the West Indies.

In 1829 his employment under the Admiralty began. During the subsequent years he served as a Commissioner under the Reform Boundary Act and the Municipal Corporations Act, and on various other important services. In 1836 he was appointed Director of the Architectural and Engineering Works of the Admiralty. This office he held for ten years, to the great benefit of the public service, and received a letter of thanks from the Board of Admiralty, when, in 1846, he was appointed to a seat in the new Government department called 'the Railway Board,' which he held until the period of his death. He has left some very valuable papers respecting most of our colonial possessions, in which he was employed at various times.

Sir Grenville Temple was well known for his geographical and antiquarian researches in the Mediterranean, and especially on the coast of Africa. In 1835 he published a small work, in which he has recorded the results of his investigations.

Sir James Annesley was a physician of some celebrity in the East India Company's service. He published some valuable works on the botany of India, and on the diseases of tropical climates.

Mr. W. Wittich was another of our members whom we have lost. Amongst other works which he has published I may mention his series of the 'Curiosities of Physical Geography,' in which he has described some of those natural phenomena which characterise particular portions of the earth's surface, such as icebergs, glaciers, trade-winds, monsoons, deserts, &c. These volumes were published in 1845. He was also the author of a work on Canada conjointly with Mr. G. Long, and contributed many, if not most, of the articles on geography to the 'Penny Cyclopædia.'

We have also to record the loss of Captain Grover, one of the most zealous promoters of the chivalrous enterprise of the Rev. Dr. Wolfe to Bokhara to investigate the fate of two gallant officers. The investigation, it is well known, terminated in the conviction of their assassination by the orders of a barbarous chieftain. But Captain Grover's efforts in the cause of humanity are not the less deserving of our admiration, and of being recorded as one of the most meritorious acts in the life of the gallant officer.

Mr. Hatchett was a Fellow of the Royal Society, and a distinguished chemist. For many years he was an intimate friend of Sir Humphry Davy, and many of his memoirs have been published in the 'Philosophical Transactions.'

OUR OWN LABOURS.

In noticing the communications which have been read at our evening meetings during the past season, it will be unnecessary for me to detain you long, as many of them will be published in the ensuing number of the Journal, which I trust will soon be ready for distribution amongst the members of the Society.

The remarkable features of the country surrounding the Dead Sea, and the still more remarkable depression of the surface of its waters below the level of the Mediterranean, could not fail to attract the attention of Dr. Robinson, the author of '*Biblical Researches in the East*,' who, arguing on the strength of certain data which he assumed to be correct, and which, it is but fair to state, he derived from the Journals of this Society, has, in a paper lately read before the Society, expressed his doubts as to the conclusions to which the scientific travellers who have lately visited that country have come; but it would appear, that instead of questioning the fact of the depression of the Dead Sea, the data on which he had relied were incorrect. In the first place, he has assumed that the statement that the Lake of Tiberias is only 328 feet below the Mediterranean is correct; and, secondly, that the distance between the points where the Jordan leaves the Lake of Tiberias, and where it enters the Dead Sea, is only 60 miles. These facts, if correct, would certainly give a fall of about 16 feet in every mile of its course. This is the principal point on which Dr. Robinson founds his objection to the assumed depression of the Dead Sea. The fact, however, is, according to the most authentic measurements, viz., those of Dr. Russegger and of M. von Wildenbruch, the Prussian Consul, that the depression of the Lake of Tiberias is much more considerable than has yet been supposed, being, according to the former, 625 French feet, and, according to the latter, 793 feet below the Mediterranean. Again, the distance between these two points is, according to Russegger, 20 German geographical miles, equal to 80 English, or upwards of 90 statute miles. Thus, according to these corrections alone, the fall of the Jordan between the two lakes is not more than 8 feet per mile; an amount of inclination really small when the nature of its bed is considered.

But on this subject we have had another paper by Mr. Petermann, a fellow of this Society, who, bringing to bear the information he has obtained in his hydrographical pursuits, respecting the average fall and inclination of rivers in the United Kingdom, has shown, in his paper on the fall of the Jordan and other rivers, that such a fall of 8 feet, or even more, is by no means unusual even in this country.

The fall of the Tweed in Roxburghshire and Berwickshire, during 53 miles of its middle course, exceeds  $9\frac{1}{2}$  feet per mile, and during the last 80 miles of its course, viz., from its confluence with Biggar Water to the sea, it has a fall of 605 feet, or nearly 8 feet per mile; and yet throughout this distance it has neither waterfalls, cataracts, nor rapids to prevent the navigation of small boats. Mr. Petermann's paper is full of information respecting the fall of rivers and the conditions influencing their fall. He also shows how deceptively the length of the course of a river is diminished in maps on a small scale.

Rear-Admiral Sir Francis Beaufort has communicated to us an interesting paper, drawn up by the late Lieutenant Molyneux, of H.M.S. Spartan (forwarded to him by Captain Symonds, commanding that vessel, and by whom the expedition of Lieutenant Molyneux was set on foot), giving a full account of the journey undertaken by him for the purpose of sounding the Lake of Tiberias and the Dead Sea, and of exploring the intervening portion of the valley of the Jordan. His account of the valley between the two lakes bears directly on the question of the fall of the Jordan, although he was unable to complete the inquiry in consequence of his boat having been attacked and plundered by the Arabs. It is evident, however, from his account of the winding nature of the river-bed, the shallows with which the boat had to contend, and the many weirs over which it had to be carried, that the fall must have been very considerable during the first portion of the voyage. In one place, soon after entering the Jordan, we are told that for 7 hours there was not water to float the little dingy for 100 yards together. On another occasion he says, "There are in the upper part of the river many *hundreds* of places where you might walk over, without wetting your feet, on large rocks and stones." As therefore the now corrected data only give a fall of 8 feet per mile, we may, I think, safely credit the statement that the depression of the Dead Sea is, as has been stated, at least 1340 feet below the Mediterranean. Lieutenant Molyneux does not appear to have made any observations on this point. The other portion of Lieutenant Molyneux's paper gives an account of his proceedings in sounding the Dead Sea, in which, notwithstanding his difficulties and the absence of his English sailors, he succeeded in getting three casts with his deep sea lead, in those places which appeared to him to be the deepest portions of the lake. These casts were as follows—225, 178, and 183 fathoms. The Lake of Tiberias is comparatively shallow, the deepest soundings not exceeding 20 to 26 fathoms. I regret to have to state that this gallant officer died, soon after his return to his ship, from the combined effects of climate and over-exertion.

Two communications have been read respecting the discovery of coal on the western shores of Australia, about 4° N. of Perth and the Swan River. The first of these is an account of an expedition undertaken by Messrs. Gregory, for the purpose of examining the country to the E. and N. of Toodgay, and of ascertaining the general trend of the waters to the eastward of Lake Brown. They succeeded after a long journey in discovering two good seams of coal in the bed of what they supposed to be the river Irwin. The second is an account by Lieutenant Helpman, R.N., commanding the colonial schooner *Champion*, of an expedition to examine this coal, of which they brought away several cwt. He discovered a snug harbour protected by a natural pier of coral, very useful for small coasting vessels, which was named Port Grey; it is near the mouth of the river Chapman and Champion Bay.

Subsequent investigations seem to point out an error in the nomenclature of the rivers, and other positions on this coast, and to show that in fact the river called the Irwin in these communications, is really the Arrowsmith. This error seems to have been occasioned by the Messrs. Gregory finding a river in the same latitude as that in which the Irwin was placed by Captain Grey, on his rapid journey after being wrecked in Ganthcaume Bay, when he exaggerated his distances in the first part of his journey, bringing all the rivers too far S. All these points will be made clear in the new map of the western coast of Australia, about to be published by Mr. J. Arrowsmith.

A memoir by Mr. Duncan has also been read, detailing his journey from Abomey, in the kingdom of Dahomey, to Adafoodiah, in the interior. The substance of this paper has been incorporated in the work published by Mr. Duncan, which I shall hereafter mention.

From another of our members, Mr. F. Ayrton, we have had an interesting paper, entitled 'Observations upon M. d'Abbadie's Account of his Discoveries of the Sources of the White Nile, and on certain Statements and Objections by Dr. Beke.' In this paper, which I trust will be shortly printed in our Journal, the author endeavours to show that there is more probability of correctness in the statement of M. d'Abbadie as to the position of the sources of the White Nile, than in the assumption of Dr. Beke that they are to be looked for two or more degrees to the S. of the Equator. This position the author endeavours to prove by several arguments drawn from the physical character of the country, its history, and its nomenclature. He points out that the Mountains of the Moon, *σεληνης ορος*, in which, according to Ptolemy's account, the White Nile rises, are the Gebel el Qamar of Arabian geographers, and he identifies this name of Qamar, Qomr, or

Qomri, &c., with Gamaro, the name of the district of Abessinia in which, according to M. d'Abbadie, the Nile rises. He shows satisfactorily, from the nature of the trade in ancient times and its distribution between Arabs and Greeks, that the Greeks would naturally obtain their information respecting inland parts of Abessinia, then lately conquered by the Arabs, from the Arabs themselves. Again, arguing from the facts that owing to the rise and inclination of the river the chief source of the White Nile must be amidst high mountains, and that the clouds and moisture brought up by the S.W. monsoon are condensed on the high mountains of Inarya and Kaffa, he shows that there cannot exist S. of these mountains any loftier range, because, if so, it would have intercepted the moisture and rain of the monsoon; and he further shows that, as in a tropical climate, no great river could take its origin except amidst a lofty mountain range, we have no authority for looking for the sources of the Nile in a district where it is shown no elevated mountains can exist.

You have also lately heard read a memoir by Mr. Leigh, giving an account of a visit to the river Zambesi, on the eastern coast of Africa. The author gives an animated description of the town of Quillimane and the habits and manners of the inhabitants, a mixture of negro and Portuguese, apparently very favourable to the encouragement of the slave trade; he also describes the scenery of the neighbourhood and the low banks of the marshy sluggish river.

Mr. M'Queen has lately communicated three papers to the Society. One is an itinerary by a Moorish merchant, named Hamed Essagheen, who had travelled seven times from Tripoli to Kano, detailing a caravan route from Ghraat to Kano, which had occupied 67 days. Mr. M'Queen considers this itinerary very valuable, as fixing the position of several important places in this part of Africa, explaining doubts and correcting errors. The other two communications were by Lieut. Barker and Lieut. Cruttenden respectively, two gallant officers of the Indian navy. That by Lieut. Barker contains an account of the islands of Mushahk, Tajourah, Zeylah, Berbera, and other places along the northern coast of the great eastern horn of eastern Africa, outside the straits of Bab-el-Mandeb, and also some details of their inhabitants, with accounts of the principal places in the interior, as Hurrurh, near the Galla country, a town said to possess great advantages for penetrating into the interior.

Lieut. Cruttenden's paper relates to a more eastern and southern portion of the same country. He describes the Somali and other tribes, and the peculiarities of the port of Berbera, where the great annual mart is held, and where the natives bring down vast quantities of gum,

frankincense, &c., from the rich valleys of the interior, to exchange for the produce of Europe and of India. In the western portion of the country coffee is very abundant; to the eastward the coffee vanishes, and the hills produce so great an abundance of gums, that the author thinks the *regio thurifera* ought properly to be looked for in this direction. Upwards of 1500 tons of gums are said to be exported in one year, and great facilities for trade are said to exist.

#### EUROPE.

In proceeding now to narrate the progress of our science during the past year, I shall I think best consult your convenience by giving to the various subjects which I have to bring under your notice a certain geographical order, arranging them, as well as the works in which they are described, rather according to the countries to which they relate, than to those from which the expeditions have proceeded, or in which the works have been published.

#### HOME SURVEYS.

The progress of the surveys of our own coasts has proceeded with all the rapidity and zeal compatible with the calls which have been made on the service for the use of the vessels for other important duties. No less than six of these vessels were last year detached from their ordinary service for the purpose of conveying food to the districts on the west of Ireland suffering under the pressure of famine and distress.

The Ordnance Survey has also made considerable progress, and a survey of London, to be constructed on a very large scale, has been commenced.

*Ireland.*—Captain Yolland, R.E., has published an account of the measurement of the Lough Foyle base, in Ireland,—a very important feature in the Ordnance Survey of that country.

#### CHARTS, MAPS, AND ATLAS.

Among the charts lately published by the Hydrographical Office, I would particularly mention the two sheets of Arctic America, on which are laid down the recent discoveries of Dr. Rae. We have also received charts of several of the islands in the Greek Archipelago, and of the harbours on the coast, amongst which, one of Boodroom, the ancient Halicarnassus, is particularly deserving of attention. Several charts of the coast of England, Scotland, and Ireland have also been published during the past year. Mr. Arrowsmith has also given us a map of the discoveries of the Hudson's Bay Com-

pany's Arctic Expedition to the North of Repulse Bay, conducted by Dr. Rae, in 1846 and 1847, showing in connection the discoveries made by Parry, Ross, Back, and the Company's expedition conducted by Dease and Simpson in 1838 and 1839.

#### PHYSICAL GEOGRAPHY.

*Berghaus' Physical Atlas*.—I am happy to be able to announce the completion of the beautiful edition of 'Berghaus' Physical Atlas,' by Mr. Alexander K Johnston, of Edinburgh. The three last parts have just been published, and will no doubt add considerable interest to the study of physical geography, the importance of which is hardly yet fully appreciated by the public. The value of the maps contained in these last numbers has been increased by the addition of an excellent coloured Geological Map of the British Isles, by Professor Ed. Forbes ; and although the colouring may be said to be somewhat bright, it conveys a vivid impression of the varied nature of the stratification intended to be represented.

To those who may be deterred by the price from availing themselves of this useful work, I am glad to announce the appearance of the first number of a similar work brought out in a cheap form, and probably containing, on a small scale, most of the information to be met with in the larger work. It is called 'A Descriptive Atlas of Astronomy and of Physical and Political Geography,' and professes to embrace the latest information and most recent discoveries in astronomical and geographical science. The maps will be accompanied by descriptive letter-press, and will consist of three series :—1. Astronomical maps ; 2. Physical Maps ; and 3. Political maps. The contents of the first number are—a map of Africa ; a meteorological map of the world, showing the distribution of the temperature of the air ; and, thirdly, a celestial planisphere, or map of the heavens. The physical maps will be constructed by Mr. Petermann, to whom I have already alluded, and who was formerly in Professor Berghaus' geographical establishment in Potsdam.

*Mrs. Somerville*.—I am happy to be able to announce the publication of an interesting work in two small volumes by Mrs. Somerville on Physical Geography. The importance of this subject renders it the more satisfactory that it should have been taken up and treated by a writer already so well and so favourably known. The graphic style and manner in which the different branches of the subject, not in themselves new, have been arranged and discussed by Mrs. Somerville, will, I trust, make her unpretending volumes universal favourites : I

must therefore content myself with a very brief and rapid notice of their contents.

Commencing her work with a masterly sketch of the geological features of the world's history, Mrs. Somerville describes the successive formations which constitute the crust of the earth, and the different systems of animal life which have successively prevailed upon the surface,—altered, modified, and adapted as that life has been to meet the constantly varying conditions in which it was to exist. These various periods, with their respective organisms, are rapidly but clearly described, and we are brought to the termination of the tertiary period, when the earth had obtained nearly the same state and form with regard to the distribution of earth and water as prevails at present. The vast continents, mountain-ranges, and elevated table-lands of Europe and of Asia and of Africa are then described, with all their peculiarities of form and temperature; and crossing the Atlantic, we are made to survey with a rapid glance the Andes and the mountains of Brazil, and then to pass over the deserts of Patagonia, the pampas of Buenos Ayres, the silvas of the Amazons, and the llanos of the Orinoco and Venezuela.

Nor are the peculiar characters of the frigid North less graphically described. The inhospitable regions of Greenland and the Polar Seas, and the volcanic phenomena of Iceland contrasted with its perpetual snow and never-ending glaciers, are ably brought out: and after describing the Australian continent, the Indian Archipelago, with the atolls and coral reefs of various kinds, and the thousand isles of the Pacific, the theory of alternate areas of subsidence and elevation is discussed; and our author adds, “There are strong reasons for believing that a continent once occupied a great portion of the tropical Pacific, some part of which subsided by slow and imperceptible degrees. As portions of it gradually sank down below the surface of the deep, the tops of mountains and table-lands would remain as islands of different magnitude and elevation, and would form archipelagos elongated in the direction of the mountain-chains.”

There is nothing improbable in this suggestion. That the form of the earth's crust has been modified and altered by the effect of volcanic phenomena, and the consequences of the periodical escape of elastic gases generated within the earth by the action of a central heat, is a principle now universally admitted. Proof is not wanting that the lofty Andes have been elevated to their enormous height by slow and gradual processes within a comparatively recent period; and it may easily be demonstrated that where detached portions of the earth's crust have been raised by means of these subterranean forces acting

only on one extremity of a given mass, the other extremity would necessarily be proportionally depressed.

Quitting the important agent of fire, as exhibited in earthquakes and volcanoes, in modifying the earth's surface, the other agent, water, is no less forcibly discussed, as developed in the numerous river systems of the world, and in the mighty ocean itself, its tides, its currents, and its waves.

The second volume is chiefly devoted to a consideration of the animal and vegetable life distributed for the various and specific purposes to which they are adapted, over the different continents and waters of the globe. The peculiar faunas and floras of the great divisions of the earth, and of their different climates and temperatures, are spread out before us with a clear and concise generalization; and the whole subject concludes with an account of the distribution and condition of man—the last in the order of creation, as he is the first in order of intellect of all created beings on our globe. His physical and moral conditions are discussed, as well as his mental influence on others of his own race, and the empire he exercises over all around him. The progress of civilization and the moral improvement of his character hold out the hope that no retrograde movement is now possible, and “the diffusion of Christian virtue and knowledge ensures the progressive advancement of man in those high moral and intellectual qualities that constitute his true dignity.”

*England.*—Mr. A. K. Johnston has also published a new Commercial and Industrial Map of England, Wales, and part of Scotland, showing the lines of Railways completed and in progress, in four sheets, 1847.

He has also published a Map of Geographical Terms, to accompany which our late Secretary, Colonel Jackson, had written a glossary, which has been published within the last few days.

Mr. T. W. Saunders has published, during the last year, a geographical Catalogue of all Globes, Atlases, Maps, and Plans which he has for sale. The list at present is chiefly British; it might with advantage be extended so as to contain notices of more foreign maps.

*France.*—We have received during the past year a valuable collection of charts from the *Dépôt de la Marine* at Paris, consisting of not less than 117 charts: 12 of these, published during the past year, relate to the expedition of the *Astrolabe*, under M. Dumont d'Urville, to the South Pole and Oceania, comprising the Sandwich and Philippine Islands, the east coast of New Holland, the Caroline Islands, the islands of the Pacific, New Guinea, Tasmania, &c. We have also four charts

of various ports on the coast of Africa, several sheets of the coast of France, the Straits of Singapore, &c.; also a considerable portion of the course of the Amazon from its mouth upwards, published in 1846.

*Geographical Positions.*—From the table of geographical positions by M. Daussey, extracted from the ‘*Connaissance des Temps de 1848*,’ we learn that many additions and corrections have been made this year in the positions of several important places. In France the general triangulation of 1844 has led to many corrections. The longitude of Dublin has been considerably modified, in accordance with the latest Admiralty Charts. In Germany, New Holland, and the Antilles, some modifications have also been made, from better and more recent information.

*Laguillermie.*—I cannot avoid calling the attention of the Society to some curious and ingenious maps constructed by M. Laguillermie of Paris. These maps are so shaded as to bring out the convexity of the spheroid in all parts—that portion to which each map specially refers being placed in the centre, and consequently least shaded and least distorted; the other portions, being naturally foreshortened, are more distorted, and can only be studied in the different sheets of the Atlas. In short, these spherical maps of M. Laguillermie are intended to give an idea of the appearance of the earth as seen from different points without it. M. Laguillermie has presented a series of these maps to the Society.

*Jomard.*—M. Jomard has prepared for publication a work under the title of ‘*Monuments of Geography*,’ intended to form a collection of maps of the middle ages. The first portion of the work consists of an introduction, with plates of celestial globes, and others relating to cosmography, an Arabic astrolabe, &c. The more geographical portion consists at present of 30 plates, amongst the oldest of which are—the map of the Scheryf El-Edrisi; an itinerary of a pilgrimage from London to Jerusalem, taken from a MS. copy of the Chronicles of Matthew Paris, of the thirteenth century; the famous Venetian map of the brothers Pizzigani, with the date 1367, preserved in the library of Parma. It is said that the whole work will contain at least 100 documents of this description.

M. Walchenaër, perpetual secretary of the Académie des Inscriptions, has recently published two maps of France, one of which is specially intended to point out the numerous features of physical geography, the other to illustrate the comparative geography of ancient Gaul.

*Italy.*—Your attention was called by my predecessor last year to the changes taking place in the height of the edge of the crater of

Vesuvius, as compared with a fixed point (the Punta del Palo), which for upwards of half a century had been the culminating point of the outer circumference. It appears from a letter addressed to M. Arago, by M. Amante, that the burning cone, which on the 27th of February, 1846, was 9·5 metres *below* the Punta (the height of the Punta being 1203 metres), had been gradually rising, and on the 5th of July, 1846, was 1219·5 metres, consequently 16 metres *above* it; but on the 16th of August, 1847, the cone had reached the height of 1240 metres, viz. 37 metres above the Punta.

*Sardinia.*—Several additional Numbers (56 to 70 inclusive) of the 'Dizionario Geografico-Statistico Commerciale degli Stati di S. M. il Re di Sardinia' have been published since our last anniversary.

*Belgium.*—M. Vandermaelen has published 6 more sheets of the map of Belgium, on a scale of  $\frac{1}{500,000}$ . He has also commenced the publication of a large topographical map of Belgium, in 250 sheets, and on a scale of  $\frac{1}{200,000}$ . The execution of these maps seems in every way equal to their importance.

*Kosmos.*—The translation of the second volume of the 'Kosmos' of Baron A. von Humboldt has appeared since our last meeting. It must become a universal favourite. In many respects it occupies a different field from that of its predecessor. While the first volume was chiefly directed to a comprehensive sketch of the phenomena of the outward physical world, this second volume is rather directed to the consideration of the influence of outward nature on the mind of man, and of the effect thereby produced in modifying the feelings and advancing the civilization of the human race. The work is divided into two parts:—First, the incitements to the study of nature; and, second, the history of the physical contemplation of the universe. There is a strength and a simplicity, and at the same time a truth pervading all the observations in this work, which cannot fail to charm. Who does not feel, and at the same time cherish, the force of such a remark as the following, in alluding to the impression made on the mind by groups of exotic plants in hothouses or in the open air?—"I have already appealed on this subject to my own youthful experience, when the sight of a colossal dragon-tree and of a fan palm, in an old tower of the Botanic Garden at Berlin, implanted in my breast the first germ of an irrepressible longing for distant travel." What do we not owe to that old dragon-tree and fan palm!

But I have only room to quote a concluding paragraph:—"I approach the termination of a comprehensive and hazardous undertaking. More than two thousand years have been passed in review, from the earliest state of intellectual cultivation among the nations who dwelt

round the basin of the Mediterranean and in the fertile river districts of Western Asia, to a period the views and feelings of which pass by almost imperceptible shades into those of our own age. I have sought to present the history of the gradually developed knowledge and recognition of the universe as a whole, in seven distinctly marked sections, or, as it were, in a series of as many distinct pictures. Whether any measure of success has attended this attempt to maintain in their due subordination the mass of accumulated materials, to seize the character of the leading epochs, and to mark the paths in which ideas and civilization have been conducted onwards, cannot be determined by him who, with a just mistrust of his remaining powers, knows only that the type of so great an undertaking has floated in clear though general outlines before his mental eye." Alex. von Humboldt may safely appeal to the verdict of the universal world.

*Austria.*—Professor W. Haidinger has published, in 1847, a notice intended to accompany his geognostic map of the Austrian monarchy in nine sheets, explaining the sources from which his information was derived.

*Germany.*—Professor von Oeynhausen has published at Berlin, during the last year, a large geognostical and orographical map of the neighbourhood of the Laacher See in the Lower Eifel, in eight sheets. This map extends from Brohl to Lahnstein from N. to S., and from Mayen to Ems from E. to W.; it is on the large scale of  $\frac{1}{20000}$ , or about  $2\frac{3}{4}$  inches to the mile. It is extracted from the cadastral map of the Rhine provinces, and is accompanied by an explanatory memoir by the same author.

Amongst the many maps which have lately appeared in Germany, I may mention a geological map of Hesse-Darmstadt, published by Becher, in which the different formations are represented by printed colours; Spruner's historisch-geographisch Hand-Atlas, published at Gotha, consisting of 73 coloured maps; Sieder's map of Germany, the Netherlands, Belgium, and Switzerland, with a classification of mountain chains, in 25 sheets; a map of the course of the Oxus, by Zimmerman; and an atlas by Sydow.

*Norway.*—Captain Roosen of the Engineers, in Norway, has presented to the Academy of Sciences a geographical map of Norway, with a MS. memoir on the physical geography of that country.

*Sweden.*—*Maps of the Crown-Prince.*—I cannot omit to notice the maps of part of Sweden executed by the Crown-Prince, and exhibited by Count Rosen to the meeting of the British Association at Oxford. One of these maps represents the physical features of the country in a scale of colours, a dark-green tint being used to represent all parts of

the country less elevated than 100 feet above the sea; another represents, also by a scale of colours, the extent of the wooded districts and their relative ages; on a third map are marked all the mining districts, the mines themselves being marked by dots of colours; the route by which the ore is conveyed to the blast furnaces, and the ports, being indicated by lines of the same colour.

A map by Colonel Löwen was also exhibited at the same time, showing the amount of population in different districts varying from 500 to 15,000 per square mile. This was also done by the use of different colours.

RUSSIA.—*Petschora*.—Count Keyserling, one of the companions of Sir R. Murchison in his Russian travels, has lately published a work entitled 'Scientific Observations on a Journey into the Petschora Country.' By this work much additional information is gained respecting the great north-eastern angle of Russia in Europe, which is watered by the river Petschora. Count Keyserling's attention being chiefly directed towards the geology of the district, the geographical and astronomical duties were intrusted to M. von Krusenstern, of the imperial navy. My remarks must be confined to the latter portion of the work. In this respect the principal results obtained have been the fixing the latitudes and longitudes of from 45 to 50 places by means of chronometers and circummeridional altitudes of the sun, and laying down the course of the rivers by constant observations of their daily track recorded in a regular nautical log-book. M. von Krusenstern has thus been able to give a full account of the geography and hydrography of the Petschora country.

The boundaries of the Petschora country are stated to be, on the E. the Ural; on the W. the Timan mountains, a slightly elevated range of hills forming the watershed between the confluent of the Petschora and those of the Mesen, the Wymm, and the Wytschegda; on the N. the Polar Sea; and on the S. the Upper Wytschegda and the Upper Petschora, with their confluent. The space contained within these limits is calculated to be about 6500 geographical square miles.

M. von Krusenstern fully describes the different people and races by whom this vast district is inhabited, together with their trade and commerce. Fishing is their principal occupation, the produce of which they exchange with the traders for corn from the more southern regions of the Volga. This, however, on account of the difficulties of transport, fetches a high price in these arctic regions. The communications are chiefly kept up by rivers, with short *portages* from one to the other. Many parts of the country are studded with small lakes, showing a striking uniformity of character with some of our own possessions in

the northern regions of the American continent. The great wealth of the country consists in its vast forests, chiefly of larch. These are of increasing value for ship-building, as timber for such purposes is beginning to be scarce in the government of Archangel. The different river systems of the district, together with all their confluent, are then systematically described. We are still led by Count Keyserling to expect appendices on the structure of the country, together with notices on its physical condition, natural history, and statistics.

*Northern Ural.*—It was announced in the Address from this chair last year, that the Russian Geographical Society was about to dispatch an expedition of discovery to examine the northern portion of the Ural mountain chain. Considering the investigation of the vast and hitherto unknown districts of its own country as the chief object of its exertions, its attention was at once directed to the north-eastern portion of European Russia, rather than to the more distant regions of Siberia, viz., to the northern Ural district, a country in a scientific point of view less known than almost any other. Having come to this determination, it was most liberally assisted by the imperial treasury. The boundaries of the district to be surveyed are, on the N. the Arctic Ocean, on the E. a line drawn from Bogoslawsk to Beresow, and from thence along the Ob as far as its embouchure; and on the W. a line beginning on the Korotaicha, then following the Ussa and the Petschora, and afterwards running along the Kolwa and Wyschera towards Bogoslawsk. Some idea of the nature of the expedition may be formed by stating, that its most southern point is in the latitude of Tscherdyn, about 62° N. The exploring party left Tscherdyn on the 30th of May in two divisions. The only accounts which have reached this country are from Colonel Hoffmann, the chief of the expedition, dated the 15th of July O.S., from the sources of the Petschora.

The chief results then reported were that M. Kowalski had fixed by astronomical observations 24 points; the topographer, M. Jurjew, had traced the course of the Wyschera from Tscherdyn to its sources, and the direction of the mountain-chain from thence to the sources of the Petschora. M. Branth had made a large collection of objects of natural history. With regard to the physical geography of the country Colonel Hoffmann says—"The long-extended mountains with conical summits are separated by valleys of no great breadth, and scarcely reach the height of 3000 feet; their flanks are well wooded, but the ridges are bare and covered with loose broken stones." It was proposed that the expedition should occupy two years: we shall await its results with interest and anxiety.

*Erman.*—The name of Adolph Erman has been so often mentioned

in this Society in terms of admiration and of praise, that I cannot omit alluding with satisfaction to the fact that Mr. Cooley has published a translation of his work ‘*Reise um die Erde,*’ under the title of ‘*Travels in Siberia including excursions northwards down the Obi to the polar circle, and southwards to the Chinese frontier.*’ You will remember that in 1843 the Council awarded a gold medal to Professor Erman for his extensive geographical labours. On that occasion Sir R. Murchison entered fully into the merits of his works; I will, therefore, now only observe, that the scientific position of Adolph Erman, and the interest attaching to the physical and geographical characters of the country through which he travelled, and of which we are still so ignorant, impart a value to Mr. Cooley’s undertaking, only inferior to that which attaches to the ‘*Kosmos*’ of Humboldt. While the one has described in vivid terms of reality the charms and wonders of the tropical and equinoctial regions of America, we are here no less forcibly arrested by the wild yet picturesque description of the roaming Samoyede, and the wealth and comforts of the Yakuts in a climate which at first sight seems hardly compatible with human existence: but I must refer you to the volumes themselves to appreciate their merits.

Mr. Cooley informs us that he has ventured to abridge the original in the earlier portion of the work, viz., the journey across Europe from Berlin to Tobolsk. He has thus been enabled to give, in two volumes and without curtailment, the more novel and interesting part of the author’s narrative in Siberia.

*Hoffmann.*—Professor Hoffmann has recently published an account of his journeys in former years to the gold-washings in eastern Siberia. The work will be found to contain much interesting information for the geographer and the geologist. He was sent by the Government to investigate the geognostic character of the gold-works of Siberia. The results, already published in Russia, but without the geographical details of his journey, were particularly alluded to by Sir R. Murchison in his Address from this chair in 1844, and therefore require less notice at my hands on the present occasion. The chief locality of this Siberian el Dorado is in the vicinity of Irkutsk, westward of the Lake of Baikal, and on the northern flanks of the Sagan mountains, the eastern prolongation of the Altai. The land in Siberia belongs to the crown, but permission is granted to private individuals, under certain conditions, to search for gold. The result is very uncertain. Professor Hoffmann gives a striking sketch of the difficulties to be overcome by the Siberian gold-searchers. “The whole country in which the gold-washings are situated is one universal *taiga*, or district covered with primeval forests, only slightly peopled by nomadic hunting tribes, to

whose tents there are no roads, and which is only rarely visited in the winter by the foot of a Russian fur-hunter. The moisture of the atmosphere has almost everywhere converted the soil into a morass, extending from the marshy valleys to the summits of the mountains, and in which both man and beast sink deep in crossing it. Spots of grass and pasture are very rare amidst the mossy covering. The gold-searchers, separated from villages many hundred wersts, must carry all their provisions with them, which can only consist of dry and salt food. What with sleeping on wet moss, constant rain, digging in the morass, they never have their clothes dry; add to this the constant fatigue in sinking the pits, which are scarcely ten feet deep before they are filled with water; this must be pumped out, while the labourers, standing deep in the mud, carry down the shaft to the underlying rock, the only means of ascertaining that they have not neglected any gold-sand stratum." Many pits are sunk in vain, and a district is often abandoned in despair in the immediate neighbourhood of the precious object of search. Moreover, the adventurers are often overtaken by the winter's snow before they have time to extricate themselves from this wooded labyrinth.

*Tradescant.*—From Russia we have also lately received an interesting work from the pen of Dr. J. Hamel, member of the Imperial Academy of Sciences at St. Petersburg, entitled 'Tradescant the Elder, in Russia, 1618,' in which the author gives a full account of the origin of the commerce between England and Russia, with an analysis of the earliest travels in the North, and of the voyages of discovery round the North Cape to Archangel, by which that commerce was first established. The name of Tradescant is well known as the founder of the first museum of natural history in this country, which became the nucleus of the Ashmolean Museum. The most interesting portion of the volume is the account given by Dr. Hamel of his discovery, during his stay in this country, of a MS. in the Ashmolean Museum, marked No. 824—XVI., and entitled 'A Voiag of Ambassad (to Russia), undertaken by the Rt. Honorable Sir Dudlie Diggs in the year 1618, &c.' Dr. Hamel proves satisfactorily, from internal and collateral evidence, that this MS. is the work of John Tradescant himself, of whom no writings were hitherto supposed to exist, and who thus appears to have accompanied Sir D. Diggs as naturalist to the expedition. I trust that some of our antiquarian or publishing societies will undertake the publication of this rare work, one of the earliest accounts we have of a voyage embracing scientific objects.

## ASIA.

I shall now proceed to state the progress of our science in the more tropical regions of Asia.

*Bosphorus.*—M. Hommaire de Hell, who quitted Paris last year with the intention of examining the country to the east of the Caspian Sea, and near the lake Aral, has sent home an interesting statement respecting the levels of the Bosphorus, published in the *Comptes Rendus*. From a series of observations made with great accuracy, he concludes that there is no appreciable difference of level between the Black Sea and the Sea of Marmora; consequently that there is no real current flowing out of the Black Sea through the Bosphorus. He supposes all the apparent currents to be entirely owing to the action of the winds; and, as the north winds are the most prevalent, the apparent and the most constant current flows towards the south. This, however, he supposes to be compensated for by the strong currents flowing to the north during the southerly winds. M. Hommaire de Hell subsequently proceeded from Trebizond to Diarbekir, through Kurdistan, and thence to Tabriz (here called Tauris) by Betlis and Lake Van. Many sites have been fixed by observations of altitude and compass bearings. I may here mention that M. Hommaire de Hell's former work, entitled '*Travels in the Steppes of the Caspian Sea, the Crimea, the Caucasus,*' &c., has been translated into English, and published in the '*Foreign Library*' of Chapman and Hall.

*Asia Minor.*—The discoveries of our associate, Sir Charles Fellows, in Lycia, and adjacent parts of Asia Minor, must be in the recollection of my hearers. We are informed that the results of his several expeditions into that country are about to be recorded in a permanent manner by the publication of a work by Mr. George Scharf, illustrating the Xanthian marbles, and the scenery of Xanthus itself. The engravings will be accompanied by descriptive letter-press by Sir C. Fellows.

M. Tchihatcheff, the distinguished Russian geographer and geologist, continues his explorations in Asia Minor. In a letter to M. Elie de Beaumont, recently published, he has given an account of the discovery of extensive beds of emery in the western portions of Asia Minor, particularly between the ruins of Stratonicea in Caria, and Smyrna.

Col. Lapie has completed a Map, in six sheets, comprising the countries situated between the Ægean Sea and the Indus, viz. Asia Minor, Armenia, Syria, the banks of the Euphrates, Persia, and Bokhara.

*Syria.*—Amongst the works which have been published since our last anniversary, giving additional information respecting the ancient and modern geography of the East, I must not omit to notice the volumes of Dr. Wilson, entitled ‘Lands of the Bible.’ It is true that most of the localities he visited have been already described, yet something new is always to be gleaned in such countries as these, by every successive traveller who employs his time and his eyes as industriously as Dr. Wilson, and who enjoys, as he did, the advantages of understanding the language of the people, and of entering into the spirit of the manners of the East. But I can only cursorily allude to a few of the new points he has established. In crossing the Peninsula of Mount Sinai we have an account of the discovery of ancient Egyptian mines not far from the celebrated Valley of Mukatteb, and much interesting detail respecting the Wadi Arabah and its neighbourhood, the localities of Petra, and the inhabitants of the surrounding districts. Dr. Wilson does not sanction the theory of the Wadi Arabah having been the channel by which the waters of the Jordan escaped previous to the destruction of the cities of the plain; he considers that the elevation of the Wadi Arabah to its present height, simultaneously with the depression of the valley of the Jordan and the bed of the Dead Sea, argues a greater convulsion of nature than we have any authority for assuming. In Palestine itself there is much of novelty and interest in Dr. Wilson’s narrative; I may mention his visit to the Dead Sea, and his notice of an island on its waters, not mentioned by many travellers, and which he cautiously suggests may have been a mass of floating bitumen. He subsequently visited the sources of the Jordan at Dan Baniyas and Hasbeiya, respecting which we have some interesting details. We have also a full account of the curious Assyrian sculptures and cuneiform inscriptions on the rocks near the mouth of the Nahr el Kelb, or ancient Lycus. The work is illustrated by numerous maps and plans. The map of the Holy Land is founded on the excellent one of Kiepert, executed under the direction of Carl Ritter, and embraces, as Dr. Wilson observes, all the improvements, modifications, and additions which the observations and inquiries of himself and companions had suggested.

*Arabia.*—I have also to announce the publication during the past year of two more volumes of Carl Ritter’s ‘Universal Geography,’ forming the eighth volume of Asia, and the sixth of Western Asia.

These volumes are entitled ‘The Comparative Geography of Arabia,’ and fully deserve the same praise and commendation already bestowed on their predecessors, for patient investigation and the collection of an immense mass of information. The history of the Pen-

insula of Arabia, from the earliest times down to the conquests of Mahomed, occupies the first chapter, this is followed by its subsequent history down to the present time, and by a full account of its geographical condition in the middle ages. The geographical description itself is divided into—1st, an account of the coast of Arabia bordering on the Persian Gulf; 2nd, the interior of Oman; 3rd, the oceanic southern coast of Hadramout and Aden; 4th, the western coast of the peninsula of Arabia along the Red Sea—this is the most elaborately worked out portion of the work, treating fully of Yemen, Hedjas, Mecca and Medina, &c.; and 5th, the interior of the peninsula and the country of the Wahabites. The work concludes with an Appendix giving an account of the geographical distribution of some characteristic products of Arabia. These are the distribution of the coffee-tree in the old world, both in its wild and cultivated state, as well as its introduction to the civilization of the Eastern and Western worlds. The camel and the date-palm, in their original state, and subsequent application to the service of man, are also fully discussed.

*Peninsula of Sinai.*—An interesting notice has been published in the ‘*Bulletin de la Société de Géographie*,’ detailing the travels of Professor Lepsius in the Peninsula of Sinai; it is accompanied by a map, pointing out the true position of Mount Sinai and Horeb, according to the views of Professor Lepsius. It is impossible to read this memoir without being struck by the learning and erudition which the Professor has brought to bear upon the subject, and the talent with which he maintains the views he has adopted.

*Arabia.*—A new Map of Arabia is announced in the ‘*Bulletin de la Société de Géographie*,’ corrected down to the last year from the most recent surveys and explorations. M. Jomard assures us that the greatest care has been bestowed on its construction.

*Assyria.*—Important discoveries have been lately made on the banks of the Euphrates and the Tigris, and particularly amidst the ruins of ancient Nineveh, in connexion with which the names of M. Botta and Mr. A. Layard have been brought so frequently before the public. Mr. Layard has rendered a great service to archæology by the many monuments of antiquity he has rescued from destruction. Besides those already arrived in this country, two or three hundred cases are now waiting the means of transport at Bombay or in the Persian Gulf. Mr. Layard is about to publish an account of his researches and his discoveries in ancient Assyria. During the nine years this gentleman has been travelling in the East, much of which time he spent amongst the Druses, he must have been enabled to collect a considerable amount of valuable geographical information.

*Indian Surveys.*—During the last year, an account of the measurement of two sections of the meridional arc of India, extending from  $\text{Lat. } 18^{\circ} 3' 15''$  to  $29^{\circ} 30' 48''$ , by Lieut.-Col. Everest, late Surveyor-General of India, has been published by order of the Court of Directors of the East India Company. It is intended to publish the first sections of the arc, which were measured by Lieut.-Colonel Lambton, uniform with the above. Lieut.-Col. Waugh, the Surveyor-General of India, is preparing to extend a series of triangles over the Punjab; he will start from one of the sides of the meridional arc. The triangulation of Bengal is proceeding satisfactorily; several parties are engaged on different meridians between that of Karora and Calcutta. A base of verification has been measured ere this in the neighbourhood of Darjeeling. A trigonometrical series is being carried on from Calcutta along the sea-coast to Ganjam. Several parties are also engaged on revenue and topographical surveys of the Bengal provinces. The triangulation of the Bombay presidency has been completed as far as the 20th degree of north latitude. Sheets 67 and 68 of the Indian Atlas have been published, and also new editions of sheets 47, 48, 49, 65, and 66.

*Marine Surveys.*—A Chart of the N.E. coast of Africa, from Cape Gardafui westward towards the Red Sea, by Captain Carless, I.N., is in the hands of the engraver, and will be published shortly. The survey of the Coromandel coast is progressing satisfactorily under Lieut. Fell, I.N.; as is also that of the coasts of Malabar and the Konkun, under Lieut. Moutrion, I.N. When these surveys are completed, nearly the whole coast, extending from Cape Gardafui round the Red Sea, the Persian Gulf, Hindostan, Arracan, and Tennasserim, will have been laid down by the officers of the Indian navy.

*India.*—We learn from public papers that an Archæological Society has been established at Delhi, and that, extending their researches beyond the limits of their own district, by the aid of the late Governor-General, they were about to explore the newly-discovered ruins of Ranode, in Scindiah's territory.

The publication of Baron Hugel's Map of the Punjab and Cashmere has been at last effected. I cannot avoid expressing a regret that this valuable work should have been so long delayed.

A Map of Bombay and the adjacent district has been published on a large scale, by the Great Indian Peninsula Railway Company, exhibiting the lines surveyed in detail and explored by that Company. Should the Companies established for the purpose of introducing railways into India succeed in their important schemes, we may look forward to much information in the cause of physical geography, from

the detailed surveys of the country which they must institute, and the close examination they must make of the various features which constitute the character of the Western Ghauts and the elevated plateaux from which the great rivers of Hindostan, such as the Godavery, the Kistna, the Tapti, and the Nerbuddah, take their rise.

And here I cannot omit to notice the interesting volume of Dr. Hoffmeister detailing his travels in Ceylon and continental India, including Nepal and other parts of the Himalayas to the borders of Thibet, with appendices, addressed to Baron Humboldt, on the geographical distribution of coniferæ on the Himalayan Mountains, on the vegetation and on the birds of the Himalayan Mountains. Dr. Hoffmeister travelled with Prince Waldemar of Prussia, and we are reminded by Carl Ritter, in a brief introduction, that the talented author was unable to complete the work himself, having fallen at his Prince's side on the battle-field of Ferozepore.

*Assam.*—We have obtained some additional information respecting the productions and geographical features of Assam by the publication of the work of an officer in the Bengal Native Infantry, during the last year. The natural capabilities of the country, both for growing tea and cotton, and collecting gold from the washings in the rivers, seem hitherto to have been completely marred by the insuperable indolence and viciousness of the inhabitants.

*Chinese Tartary.*—From India we have received accounts that an exploring expedition has been undertaken by the Indian Government, from which we may expect much valuable information respecting the countries north of the Himalayas, and extending to the frontiers of Chinese Tartary. The expedition, consisting of Captain Cunningham of the Engineers, Lieutenant Strachey, and Dr. Thompson, started from Simla about the 10th of August last. They were to proceed along the upper valley of the Sutlej, traversing the Himalaya range by the Nitec Ghaut. After tracing the junction of the eastern and northern branches of the Sutlej, they were to proceed northwards towards Yarkand, wintering at Khoten. The following season they were to proceed eastwards in different detachments, meeting again at Lassa—Lieutenant Strachey tracing the upper course of the Indus to Garoo, proceeding thence to the Lake of Mansarowara, which he already visited in 1846. and then exploring the course of the Sanpoo, to ascertain whether it falls into the Bramahputra or the Irawadi. At the same time Captain Cunningham will keep a more northerly course from Khoten to Lassa, and will endeavour to penetrate into the territories of the Celestial Empire. The expedition is well provided with

instruments of all kinds necessary for astronomical observations, and for the extension of geographical knowledge.

It is impossible not to hope for great and valuable results from such an undertaking; and it is matter of congratulation for the science of geography that the Indian Government have thus resolved to avail themselves of the services of some of their servants most distinguished for their scientific attainments, not only to develop the resources of their own territories, but to explore those of their more immediate neighbours.

*China.*—From the last annual report on the progress of geography by M. Vivien de St. Martin, we learn that the two intrepid missionaries, MM. Huc and Gabet, who had penetrated to the furthest extremities of Thibet, and had even reached Lassa, had been compelled to return to Canton over land. We are led to expect a full account of this remarkable journey, and look forward with much interest to the details it will contain of the almost unknown country through which they passed.

Mr. Thomas Taylor Meadows, interpreter to Her Majesty's Consulate at Canton, has published a work called 'Desultory Notes on the Government and People of China, and on the Chinese Language.'

Captain Forbes has also published a work entitled 'Five Years in China, from 1842 to 1847; with an Account of the Occupation of the Islands of Labuan and Borneo by Her Majesty's Forces.' In both these works will be found much information respecting the manners of the Chinese, their habits, and their customs.

And here I would wish to call your attention to a curious geographical document presented to the Society by Mr. E. O. Smith, viz. a native geographical map of China, brought from Nankin by Mr. William Houghton, R.N. Although in its general form strangely distorted according to our views of geographical proportions, it may yet be useful in pointing out the relative positions of places. At all events it is interesting as showing the state of geographical knowledge among the Chinese.

*Java.*—A very beautifully executed map of Java has been lately published by V. der Velde in two sheets. The information on which it is constructed has been obtained from official documents, and it is accompanied by an explanatory memoir.

*Borneo.*—The interest connected with the island of Borneo, since the philanthropic enterprise of Sir James Brooke was brought under the notice of the public by the volumes of Captain Keppell, describing the operations of Her Majesty's ship *Dido* while employed, in co-operation with the Rajah of Sarawak, in suppressing the piracy of the

Malays, has been so great that no less than three works on Borneo have been published during the last year.

The first contributor to our knowledge of Borneo, and the proceedings of Sir J. Brooke, appears in Mr. Low, for some time secretary to the Rajah of Sarāwak. His volumes contain very valuable information respecting the natural history and mineral productions of Borneo, particularly in the neighbourhood of Sarāwak; and as his pursuit carried him far into the interior, we find much geographical information in his interesting pages. In an ethnological point of view, also, his work deserves honourable mention, as containing many details respecting the character of the Malay and Dyak tribes.

Mr. Frank Marryat, formerly midshipman on board the Samarang, has published a work containing many drawings of the peculiar scenery of Borneo and the Indian Archipelago, as well as of the costumes and arms of the inhabitants.

And, thirdly, we are indebted to Captain Rodney Mundy, R.N., for editing the interesting Journals of Mr. Brooke, full of new matter, both geographical and ethnological, and valuable not only for the details they contain of his progress in Borneo and Celebes, and the manner in which he gradually established his influence in that country of his adoption, but also for the insight they give of the high motives by which he was actuated. Every page is suggestive of reflections, and breathes an affectionate sympathy for the Dyaks of the East, no less than for the social happiness of his native land. Captain Mundy has added to the value of these volumes by appending a Journal of his own proceedings, with some details of the geography, geology, and natural history and productions of Borneo.

*Indian Archipelago.*—During the past year we have been gratified with the publication of Sir E. Belcher's Narrative of the Voyage of Her Majesty's ship Samarang during the years 1843, 1844, 1845, and 1846, when employed in surveying the islands of the Eastern Archipelago. After visiting Borneo his attention was first directed to the islands lying off the coasts of China, which were examined in the following order:—The Bashees, Meia-co-shimahs, Luzon, Mindoro, Mindanao, Sooloo, Borneo, Celebes, and Ternate. After again touching at Borneo, the Samarang revisited Sooloo, Manilla, and Hong-Kong, with the Bashees, Meia-co-shimahs, Loo-Choo, Quelpart, Korea, and Japan; then returning by Loo-Choo and Hong-Kong, and by Manilla and the Mindoro Seas to Mindanao, and to our old possession of Balambangan, they carried out the complete survey from that island to Labuan, revisiting Sarāwak and Singapore. The volumes are full of geographical and ethnological details, and their value is increased

by the publication of Mr. Adam's notes on the natural history of the countries visited by the Samarang. I must also mention Mr. Jukès' work, giving an account of the proceedings of the Fly, chiefly employed in surveying the coast of New South Wales, under Captain Blackwood, R.N., whom you have this day elected a Member of the Council.

## AFRICA.

*Egypt.*—Directing our attention to the lands of Africa, I have to announce that Mr. Joseph Bonomi has published a small map of ancient Egypt under Antoninus Pius, A.D. 140. This map is confined entirely to the representation of the ancient geography of the country, and will be found a useful aid to the classical student and to the comparative geographer.

M. Jomard has presented to the French Academy a map of Arabia and the surrounding countries, prepared by himself, to illustrate the history of Egypt under Mehemet Ali.

M. Saint Preuve has, in a memoir addressed to the French Academy of Sciences, called in question the accuracy of the levelling of the Isthmus of Suez by the engineers of the Egyptian expedition. The comparative levels of the ocean and of the Mediterranean have also been noticed by him; and considering the physical importance of the correctness of such a statement, M. Saint Preuve has recommended that the work should be repeated. M. Rochet (d'Hericourt) is about to undertake this task, and new instruments have been made for him by M. Brunn.

*Abessinia.*—*White Nile.*—Amongst the important information which we have received during the past year, few subjects have attracted more attention than the announcement, in the 'Athenæum' of Oct. 9, by M. Antoine d'Abbadie, that he and his brother had at length, after nine years of dangers, vexations, and difficulties, succeeded in ascertaining the source of the main stream of the Egyptian Nile—the White Nile, or western branch—which was supposed, according to a paper by Dr. Beke, lately published in our Journal, to exist two or three degrees to the S. of the equator. This announcement was the more gratifying in consequence of the absence of all communication from these enterprising travellers during the last three years. M. d'Abbadie states his conviction, founded on his own observations and on the testimony of many witnesses, as to the course of the river S. of the furthest point he reached, that the Gibé of Inarya, in lat.  $34^{\circ} 38'$  E. and long.  $7^{\circ} 49'$  N., is the real source of the White Nile. This account closely corresponds with that given by Dr. Russegger in his Travels in Abessinia, &c., vol. ii. p. 87. It would

thus appear that the Gibé falls into the Godjeb, and that thence together flowing round the mountains of Kaffa and Gamaro, and turning to the westward, they fall into the Shoaberri of M. Arnaud. It is true that the whole course of these rivers has not yet been traced, and much also depends on the correctness of the statement made by some geographers, that the Godjeb forces its way through the mountains to the S.E., and falls into the Indian Ocean. This, if true, would at once disprove M. d'Abbadie's statement, but it hardly seems probable. It is, however, now the great point to make out, in the absence of the possibility of tracing the Gibé and the Godjeb to their final destination, either in the Indian Ocean or the White Nile. It would appear from M. Arnaud's statement, that the valley of the White Nile, after ascending nearly due S. as far as the third or fourth parallel of latitude, turns away towards the E., and then gradually bears away N.E., N., and N.W., until it finally reaches the sources about the seventh parallel of latitude. Several streams, bearing apparently the same name of Gibé or Gibbe, rise in this mountain district, the parent source of the Dedhesa, the Baro, and the Godjeb. We await with great anxiety further information on this interesting point.

M. Rochet (d'Hericourt), already well known for two journeys in the southern parts of Abessinia, is again preparing to penetrate into the country, and to traverse it from N. to S. After reaching Godjam, and crossing the Blue Nile, it was his intention to penetrate into Inarya and Kaffa. The French Academy have furnished M. Rochet with detailed instructions on several points of scientific interest, to which it was desirable he should direct his attention, and which I cannot avoid recommending to the notice of all future travellers. Those which are published in the *Comptes Rendus*, vol. xxv. p. 183, relate chiefly to magnetism and meteorology. They will, I am sure, be read with interest by those who are aware of the importance of such observations, and particularly of their bearings on the progress of geographical science.

*Dahomey.*—Another African traveller, Mr. Duncan, one of the survivors of the Niger expedition of 1841, has added to our knowledge of the interior of Western Africa by publishing a *Narrative of his Journey from Abomey to Adafoodia*, in 2 vols. 8vo., one of the most interesting portions of which is the account, from an eye-witness, of the death of the unfortunate Mungo Park.

There is one important conclusion which may be safely drawn from the remarks of Mr. Duncan, and which it is not altogether irrelevant to mention on the present occasion, viz. that there exists amongst the natives of this portion of Africa a strong desire to see introduced

amongst them the advantages of a more extended commerce. With commerce will necessarily be united a more enlightened civilization, and this must lead at once not only to a more perfect and more intimate knowledge of the geography of this hitherto *terra incognita*, but will also tend to strike a more deadly blow at the African slave-trade than has yet been or ever can be effected by the most powerful fleet we might maintain in those fatal seas.

*Sahara.*—From Mr. James Richardson we have had two volumes lately published, giving an account of his travels in the Great Desert of Sahara in 1845–46, with a description of the oases and cities of Ghadames, Ghraat, and Mourzuk. These volumes are useful contributions to our knowledge of the interior of the imperfectly known regions of Northern Africa; and they describe some hundreds of miles of desert routes over which no Europeans had previously passed, as well as several of the cities of the Desert, of which we had not before received accounts from European visitors. From certain observations in the introduction we are led to expect the speedy publication of a large map of the routes of this part of Africa, as well as some reports on the commerce and geography of the Great Desert. From Mr. Richardson's knowledge of the languages of this part of Africa, of which he has published some vocabularies, we may look forward to much useful information on these subjects.

M. Raffanel, whose adventurous journey into the interior of Africa has been already mentioned from this chair, is still engaged in his arduous enterprise. According to the last accounts received at Paris from him, after resting some time at Bakel, a French Senegambian establishment in the country of the Sarracolets, this enterprising traveller had crossed and explored the Mountains of the Moon (so called). He proposed to penetrate into the inner desert, and would then direct his course towards Western Nigritia.

*Mozambique.*—Lieutenant Bernard has published an account of a three years' cruise in the Mozambique Channel for the suppression of the slave-trade. The narrative is chiefly devoted to the details of the principal object of the voyage, but it also contains some account of the towns on the coast, with the habits and manners of the natives, as well as a description of the interior of the country in the neighbourhood of Quillimane, the river of which is said to be navigable during the floods for 260 leagues.

*South Africa.*—M. Adolphe Delegorgue, of Douai, has published during the past year an account of his travels in South Africa, during which he penetrated from Fort Natal as far as the tropic of Capricorn,

visiting the Amazoulia and Mohatisses Caffres, respecting whom, and the geographical features and natural productions of the country, he has brought back much valuable information.

Mr. Arrowsmith has published, during the past year, a map of the Eastern frontier of the Cape of Good Hope; and Mr. Charles Bunbury has given to the public an account of his residence at the Cape of Good Hope, in which the botany of the colony and the geographical distribution of its plants are fully and ably discussed.

#### AUSTRALIA.

I now come to that portion of the globe which embraces our Australian colonies, and here I find that Mr. A. K. Johnston has published a map of Australia Felix, or the district of Port Philip, compiled from the latest authorities up to 1847, extending from Adelaide to the Hunter river, on a scale of  $\frac{1}{275,000}$ .

Mr. Burnett, the deputy-surveyor of New South Wales, is reported to have traced the river Boyne to lat.  $24^{\circ} 53' 50''$ , where it was strongly influenced by the tide, and to have ascertained that its outlet was in Harvey's Bay.

*Maps.*—I am glad to report that we may expect the publication of another sheet of Arrowsmith's map of Western Australia in a short time; as well as a new map of Eastern Australia, in six sheets, by the same distinguished geographer, who has also made considerable progress in a large map of New Zealand, in which many corrections are made in the positions of important places.

The extraordinary mineral treasures of the colony of South Australia will give a great impetus to its prosperity, and as a necessary consequence will lead to a great increase in our geographical knowledge of the adjacent territories. We are not therefore indifferent to the accounts which have been recently sent home of the newly discovered mines of copper and of lead in that part of the world. In the Burra-Burra copper-mines some of the ores are said to be almost pure copper. Lead has also been discovered in the mountain limestone between Macquarie Harbour and the territory of the Van Diemen's Land Company.

The past year has witnessed the publication of Sir T. Mitchell's journal of his expedition into the interior of tropical Australia in search of a route from Sydney to the Gulf of Carpentaria. This expedition was mentioned in the President's address from this chair last year, and the principal results have already been alluded to in papers and extracts read before the Society; although the expedition failed in its main object, we have here much information respecting the interior

of the colony. It completes, moreover, as the author informs us, a series of internal surveys radiating from Sydney to the west, the south, and the north, which have occupied his chief attention during the last twenty years.

There is a fact connected with this journey, and bearing on the practicability of making rapid and correct surveys, which is worth recording. Sir T. Mitchell has stated in this room, that the whole of this journey was laid down from measurements with the chain, and that he had frequently had from 25 to 30 miles thus measured in one day. Although himself unable to trace the course of the Victoria to its mouth or other termination, Sir T. Mitchell looks forward with confidence to the success of Mr. Kennedy, his assistant, who has been dispatched from Sydney for the purpose of tracing the further course of the Victoria, and who he believes will ere long be heard of as having emerged on the Gulf of Carpentaria.

It may appear discouraging to express a doubt on this subject, but when we recollect Dr. Leichhardt's account of the rivers which fall from the south into the Gulf of Carpentaria, I cannot hesitate to recommend geographers not to be too sanguine as to the successful termination of this expedition.\*

*Dr. Leichhardt.*—It was stated in the address from this chair last year, that Dr. Leichhardt was about to start on a fresh journey of exploration into the interior, proposing to traverse the whole centre of the Australian continent from Sydney to Swan River. His plans and arrangements were made with great judgment and care, and principally from his own resources. Besides horses and beasts of burthen, the expedition was well provided with cattle to ensure a proper supply of animal food. Cheered by the enthusiastic good wishes of the population, no less than supported by his own energy and dearly-bought experience, everything promised that his journey would be one of the most important ever undertaken in that colony, and, besides opening up tracts of useful land in the interior, would lead to much scientific information. It was therefore with great regret that we lately heard that, after reaching the Downs of the Upper Mackenzie and Peak Range, Dr. Leichhardt had been compelled by events over which he

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\* Since the above was read, information has been received in England of Mr. Kennedy's proceedings. From this it appears that the Victoria was found not to go far northward from where Sir Thomas Mitchell left it; it then turns to the west; afterwards, for 120 miles, to south-west; and finally to south, where it is lost in a sandy, barren country, which Mr. Kennedy conjectures is the north-eastern limit of Sturt's desert. Mr. Kennedy advanced as far as latitude  $26^{\circ} 25'$ , when he was compelled by want of food and water to return. He thinks that the river will prove to be the Cooper's Creek of the latter gentleman. The country through which the Victoria flows is said to be barren and grassless.—June 1, 1848.

had no control to retrace his steps to Sydney. Nothing daunted, however, by his failure, this intrepid traveller determined again to attempt the solution of the problem, and to penetrate through the centre of the Australian continent. In the meantime he has not been idle, and while waiting for the proper season to make the necessary arrangements, he has been employed in making an excursion to FitzRoy Downs, for the purpose of examining the country between Sir Thomas Mitchell's track, and his own former route. He started on this expedition of the 9th on August last, and returned to Sydney about the beginning of October, having examined a considerable tract of country on the banks of the Dogwood Creek, the Balonne, the Colgoon, and the Condamine.\*

In Mr. J. C. Byrne's work, entitled 'Twelve Years' Wanderings in the British Colonies, from 1835 to 1847,' will also be found some geographical details of the country, and much information respecting the habits and customs of the natives of Australia. The colonies described are New Zealand, New South Wales, Australia Felix, Van Diemen's Land, South Australia, and Western Australia. The questions of emigration and colonization are fully discussed—questions intimately connected with the progress of geographical discovery, and therefore not altogether foreign to the objects which we have in view.

*Antarctic Seas.*—During the past year we have seen the publication of the work of Sir James C. Ross, giving an account of his Voyage of Discovery and Research in the Southern and Antarctic Regions during the years 1839, 1840, 1841, 1842, and 1843. The merits of Sir James Ross have been already so fully stated in this room on a former occasion, when the Council awarded him the gold medal for the discoveries he had made, that I am not now called on to do more than to record the fact of the publication of these volumes, by which the fame of our intrepid countryman (at this moment starting on a somewhat similar expedition, with the noble object of searching for a missing brother in arms and fellow-labourer in the arctic regions), will be more permanently established, and the details of his exertions and his discoveries will be made known to all the world.

#### AMERICA.

Leaving the Old World, to notice the progress of geography on the American continent, I find, in crossing the Atlantic, that, after a silence of 50 years, the volcano of the island of Fogo, one of the Cape de Verde Islands, has again broken forth, and that torrents of burning

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\* Dr. Leichhardt is reported to have again started on his great expedition across the Australian continent.

lava issuing suddenly from its seven craters have caused considerable ruin and devastation.

*Arctic Sea.*—Beginning at the northern extremity of the continent, I will mention that Leopold von Buch has published at Berlin a notice of Bear's Island, known also on English charts as Cherrie Island, situated in lat.  $74^{\circ} 80'$ , chiefly taken from the accounts of the Norwegian naturalist *Keilhau*, who visited it in 1827. This notice contains some remarks on the origin of glaciers, and some interesting observations respecting the temperature and meteorological phenomena during the winter. The S.W. winds brought rain in December; whereas with N.E. winds the island was surrounded by solid ice in June and July.

*North America.*—*Dr. Rae.*—During the past winter information was received that the expedition dispatched from Fort Churchill, in Hudson's Bay, in 1846, under the command of Dr. John Rae, for the purpose of surveying the unexplored portion of the Arctic Coast at the N.E. angle of the American continent, had returned. They succeeded in tracing the coast all the way from the Lord Mayor's Bay of Sir J. Ross to within a few miles of the Straits of the Fury and the Hecla; thus proving Sir J. Ross to have been correct in stating Boothia Felix to be a peninsula. Dr. Rae has since returned to this country, and from him full details have been received of the results of this interesting expedition. They left Churchill on the 5th of July, 1846, and proceeded to Repulse Bay, from whence they succeeded in conveying one of their boats into the Arctic Sea, west of the Melville Peninsula; this operation being facilitated by a chain of lakes which greatly reduced the portages and rendered easy the carrying of the boat. Having quitted Repulse Bay in lat.  $66^{\circ} 32' N.$ , they again reached the sea in lat.  $67^{\circ} 13' N.$ , and after tracing the coast some miles to the N.W. to about  $67^{\circ} 30' N.$ , they crossed over to Melville Peninsula.

The prevalence of northerly winds and the state of the ice proving that the survey could not be completed this season, Dr. Rae determined on returning to winter at Repulse Bay, and preparations were accordingly made to build a house for the long cold winter, and to lay in a sufficient store of provisions, consisting principally of reindeer and salmon. With the exception of what was used for cooking their provisions, they passed the whole winter without fuel; the lowest temperature experienced being  $47^{\circ}$  below zero.

On the 5th of April they again started north, and on the 8th had advanced seven miles beyond Cape Lady Pelly. On the 18th, they found themselves near the latitude and longitude of Lord Mayor's Bay of Sir John Ross, in lat.  $69^{\circ} 26'$ , and on ascending a hill near the coast, Dr. Rae had the satisfaction of finding an ice-covered sea

studded with innumerable islands. As he observes—"Lord Mayor's Bay was before me, and the islands were those named by Sir John Ross, the Sons of the Clergy." Dr. Rae had thus the satisfaction of proving the existence of a continuous line of coast from the land N. of Repulse Bay to that part of Boothia Felix where Sir John Ross had terminated his inquiries in this direction.

Returning to Repulse Bay, the expedition again started north to trace the west shore of Melville Peninsula, and proceeded as far as lat.  $69^{\circ} 30'$ , when the state of the weather and of their provisions compelled them to return.

*Arctic Expedition.*—It is with regret that I have to repeat the statement of my noble predecessor last year, that we are still without information respecting the progress of the expedition under Sir John Franklin. The Esquimaux whom Dr. Rae fell in with had heard nothing of the exploring ships, it is therefore considered probable that they are somewhere to the north or west of Barrow's Straits; let us hope, however, that before the autumn this question will be set at rest by the return of our long-absent countrymen.

In the mean time it is gratifying to know that the Government, sharing the anxiety of the public to obtain information respecting their position, have adopted the most judicious measures for the purpose.

No less than three expeditions have been undertaken for their relief. Commander Moore, in Her Majesty's ship *Plover*, has been ordered to proceed through Behring's Straits in search of the missing ships, and is already, we may believe, well advanced towards that point. Sir John Richardson, with Dr. Rae, must by this time be threading his way through the American rapids on his route to the far M<sup>r</sup>Kenzie River, from whence he will proceed along the coast in search of his friend and former captain. And, thirdly, Sir James Ross and Captain Bird, in the '*Enterprise*' and '*Investigator*,' will shortly be on their old ground in the neighbourhood of Lancaster Sound, ready to act as circumstances may require. Thus it will be seen, for the consolation of those who have friends on board, that nothing has been omitted on the part of the Government which justice could require or humanity suggest. Nor must I omit to mention the munificent reward of 2000*l.* offered by Lady Franklin for the assistance of the vessels themselves, or the first information respecting them.

*Arctic Seas.*—Mr. Ch. Martens has published a memoir giving an account, from observations taken on board the corvette '*Recherche*,' between Lapland and Spitzbergen, of the temperature of the Arctic Ocean. The observations were taken at the surface, at great depths,

and in the neighbourhood of the glaciers of Spitzbergen. The result of these observations is, that the temperature of the ocean at all depths is generally above zero. The influence of the Gulf-stream extends to the western coast of Spitzbergen.

*Hudson's Bay.*—Some information respecting the manners of the Indians and the geographical features of the country will be found in Mr. Ballantyne's volume, called 'Hudson's Bay, or Every-day Life in the Wilds of North America during Six Years' Residence in the Territories of the Hudson's Bay Company.'

*North America.*—Sir George Simpson, the Governor-in-Chief of the Hudson's Bay Company's territories, in his Narrative of a Journey round the World, has, in addition to much interesting matter respecting countries already well known, given us some information respecting the regions to the westward of the Rocky Mountains, from the Russian possessions down to California. The Sandwich Islands are also fully described and discussed. The journey round the world was completed by returning home through Siberia and Russia.

*United States.*—From the Report made to the Secretary of the Treasury of the U.S. by Professor Bache, the Superintendent of the Coast Survey, we learn that the progress of that undertaking during the past year has been highly satisfactory. The work has been extended into eighteen States on the Atlantic and Gulf of Mexico. The results of the survey between New Orleans and Mobile are very important. Great advantage has been derived from the use of steam in the hydrographical part of the work.

The following are some of the results of the proceedings of the past year in the nine sections into which the work is now divided. The primary triangulation has been extended into the southern part of Maine. Astronomical and magnetic observations have been made at one station in New Hampshire and one in Maine. The topography of Boston harbour and its vicinity has been completed from Scituate Light on the S., to Nahant Neck on the N. The hydrography of the shoals near Nantucket has made considerable progress.

In the second section, viz. from Point Judith to Cape Henlopen, observations for difference of longitude by electric telegraph have been successfully made; and Washington city, Philadelphia, and New York are now connected by this novel and exact method, which in many cases will be an important aid in geodetic operations. Observations of tides and currents have been made in Long Island Sound and Delaware Bay. In the third section, the primary triangulation has been continued down the Chesapeake towards the Potomac; and the secondary

triangulation of the Chesapeake Bay has been carried on with the primary. In the fifth section, the preliminary reconnaissance of the coast of South Carolina and Georgia has been nearly completed. In the eighth section, a base-line has been measured on Dauphin Island at the entrance of Mobile Bay; the primary triangulation of Mississippi Sound has been extended; and astronomical and magnetic observations have been made at two stations, one at the entrance to Mobile Bay, and one on Mississippi Sound; and finally, in the ninth section, a reconnaissance of the coast of Texas has been commenced from Galveston southward, and a portion of it is so far complete as to admit of beginning the secondary triangulation and the astronomical observations.

The Report itself contains much valuable information respecting the detailed position of the different shoals and ridges discovered in various parts of the survey; also an able Report on the use of the electro-magnetic telegraph for differences of longitude, and the methods employed to detect the time lost, if any, in transmitting the signals, and in measuring the distance between any two places connected by the electric telegraph. In the detailed account of the third section are some valuable observations respecting the temperature of the Gulf-stream; nothing can be more remarkable than the sudden rise from the cold water near the coast to the hot water of the gulf, forming what is called a cold wall confining the stream. the sudden changes according to the variation of the currents are also noticed.

*Atlantic Ocean.—Maps and Charts.*—Lieutenant Maury, director of the Observatory at Washington, has published Nos. 1, 2, and 3 of the charts of the winds and currents of the Atlantic. The voyage from New York to Rio Janeiro is said to have been reduced from 40 or 50 days to 29, by taking advantage of them. The same officer has also lately published a Report respecting the comparative advantages of the passage of the Isthmus of Darien as a means of direct communication between Europe and China; and he distinctly proves that, for rapid communication with China, the point of departure on the American continent should be Monterey, or some harbour in Upper California. Lieutenant Maury observes that it does not appear that the great circle route across the ocean has ever been considered as bearing upon the question of communication with China. This question cannot be solved by reference to charts or maps, in which the relative positions of places are necessarily distorted, but can only be seen on a terrestrial globe, by which we find that the shortest distance between any two places, not on the equator or on the same meridian, is along the arc of the great circle (of the globe) in the plane of which the places are

situated. "If," he says, "we take a common terrestrial globe, and draw a string tightly across it from Panama to Shanghae, it will show the shortest distance between the two places, and will represent the great circle route between them; and this string, so far from touching the Sandwich Islands, will pass through the Gulf of Mexico, thence through Louisiana towards Oregon, crossing the ocean several thousand miles to the N. of these islands. The distance by this route, were it practicable, is 1200 miles shorter than by way of the Sandwich Islands. It is, moreover, a fact that by this route a person at New Orleans is 300 miles nearer to China than when he starts from Panama by way of the Sandwich Islands, although he will have travelled 1500 miles to reach Panama." The numerous advantages pointed out by Lieutenant Maury, and detailed in his letter published in the '*Athenæum*' of May 6, 1848, are so great, and the importance of rapid communication between China and the N.W. provinces of America is so manifold, that the project appears to be deserving of serious consideration. It is proposed that it should be completed by a railroad from Memphis to Monterey, one being already commenced from Charleston to Memphis. In the mean time Lieutenant Maury recommends a horse post from Memphis to Monterey. It is unnecessary to point out further the great advantages which would accrue to geography by this rapid communication. As connected with this question, I may state that a paper was read not long ago by Mr. Joseph Glynn before the Institution of Civil Engineers, giving an account of the various plans proposed for connecting the Atlantic and Pacific Oceans by a navigable canal, in which the relative advantages of the three plans, and the parties by whom they have been respectively advocated, were explained:—1, to cross the Isthmus of Tehuantepec; 2, to ascend the river St. John and the Lake of Nicaragua; and, 3, the Isthmus of Panama. The last presents fewest obstacles.

*California*.—Dr. Coulter has recently published a work in two vols., entitled '*Adventures on the Eastern Coast of South America and in the Interior of California*.' Besides the description of the country on the main, the work also contains information respecting many of the groups of islands in the Pacific.

*Mexico*.—It is to be hoped that the war between the United States and Mexico will lead to the construction of improved maps of many portions of the continent of America hitherto but little known, particularly of the northern and western portions of Mexico and California. Not only do the necessities of war require correct maps, but the mere presence of the American army, with many intelligent engineer officers,

must lead to practical results in this respect. In the mean time Mr. G. F. Ruxton, a Fellow of this Society, has published a work entitled 'Adventures in Mexico and the Rocky Mountains,' from which many important facts and much useful geographical information may be gleaned, although written in a light and easy style, without any claim to scientific detail. His descriptions of the wild country through which he passed, and the still wilder inhabitants whom he met with, are animated and lively, and cannot fail to be read with interest.

To a certain extent the war between the United States and Mexico has already rendered some service to geography, for amongst the documents accompanying the last message of the President of the United States to the two Houses of Congress, on the 7th of December, 1847, are many observations respecting the geography of Upper California and Mexico, with maps and plans on a large scale. I regret that I cannot do more than allude thus briefly, on the present occasion, to a volume containing 1600 pages.

*West Indies.*—I have here to mention Sir R. Schomburgk's work on the History of Barbadoes, published in 1848. Although not entirely geographical, it contains so much matter directly connected with our science, that it deserves honourable mention on this occasion. The first part contains a geographical and statistical description of the island, in which the author enters fully into the climatology and meteorological phænomena of Barbadoes, graphically describing the hurricanes to which it is subject, and concluding with a minute description of the political and local geography of the island. The second part is devoted to the History of Barbadoes from the settlement of the island to the year 1846. It commences with a valuable and interesting description of the early maps of the island. It appears to have been first mentioned under the name of Bernados, in a MS. map of the world now in the British Museum, drawn on vellum, and supposed to have been executed in the time of Francis I., previous to 1536. It was subsequently called Beruados, Baruodo, and Barbudos. The third part contains remarks on the geological structure of the island, with a sketch of its natural productions.

*Panama.*—Captain Kellett, in the Herald, is continuing the survey of the coast between Panama and California. Great attention is being paid to the Panama portion of the survey, as many rivers come down to the coast from the mountains in the back, whilst others descend from the eastern side. It is stated that the river San Juan runs to within a quarter of a league of the Atrato, a river on the opposite side, navigable for large boats. Such a discovery would go far towards

facilitating a passage across the isthmus, and might supersede the unsafe anchorage at Chagres.

In the volumes of Mr. McGregor, late Secretary to the Board of Trade, the progress of America is fully developed. It is a work of great compilation and research, bringing together everything known respecting the geography and political history, and moral condition of the people of the different States now established in that vast region.

*New Granada.—Maps.*—Colonel Joaquin Acosta has lately published the first special map of the republic of New Granada which has yet appeared. It is said to contain many important corrections. Carthagena is placed in  $77^{\circ} 54' 23''$  W. long., instead of  $77^{\circ} 50'$ ; and upwards of one thousand places are fixed, not given in any former maps.

*Santa Fe de Bogota.*—M. Lewy left France in 1847 to occupy the chair of professor of chemistry and metallurgy at Santa Fe de Bogota; owing to his character and advantageous position, much information is expected from him respecting the physical geography of New Granada. Full instructions have been given him by the French Academy of Sciences to observe latitudes and longitudes, temperature, &c.

*Chili.*—M. Claude Gay has published, in Spanish, a work on the physical and political history of Chili, the result of twelve years of laborious toil. In this work the geographical features of the country have claimed and obtained a full share of M. Gay's attention. The work is accompanied by an atlas in folio. The geographical distribution of plants has also deeply engaged the attention of the author.

An interesting description of some of the features of the great rivers which traverse the plains of South America will be found in Captain Mackinnon's account of steam-warfare in the Parana, although the work itself does not claim to be classed amongst those of a strictly scientific character.

#### MISCELLANEOUS.

*Ethnography.*—The languages and histories of nations are not to be overlooked in detailing the progress of geography; I have therefore considered it my duty to call your attention to the work of Mr. Horatio Hale, philologist of the exploring expedition under Captain Wilkes, U.S.N., on the subject of migrations in the Pacific Ocean. The work is called 'Ethnography and Philology of the U.S. Exploring Expedition,' and appears well deserving of consideration. The whole question of the manners and dialects of the Polynesian races is thoroughly discussed, and the author comes to the conclusion, founded moreover on

the labours of Wm. von Humboldt, that the Polynesians belong to the same race as that which peoples the East Indian Islands; many of them, indeed, directly refer their origin to Bouro, the easternmost island of the East Indian Archipelago, inhabited by the yellow Malay race.

Mr. Wm. Hughes has published a small pamphlet, entitled 'Remarks on Geography as a Branch of Popular Education, chiefly with reference to the principles on which it should be taught in Normal Schools.'

*Earthquakes.*—In the 25th volume of the 'Comptes Rendus' will be found an account of an earthquake felt at Copaiipo (Chili), 19th January, 1847; also of an earthquake felt at Fécamp, 10th July, 1847.

Some interesting details respecting earthquakes were mentioned at the meeting of the British Association at Oxford last year, amongst which was a report on the theory of earthquake movements, by W. Hopkins, Esq.

Mr. Mallet, of Dublin, has also contributed much information on the same subject, and is now engaged in a series of experiments to solve some of the important questions respecting the undulations of the waves which accompany these phenomena.

Professor Savi, of Pisa, has also published a work on the phenomena observed during the earthquakes of Tuscany in August, 1846.

Professor Noeggerath, of Bonn, has published a collection of all the details respecting the earthquakes felt in Germany in July, 1846, from which he has calculated the focus of those shocks to have been situated on the Rhine between Bingen and Coblenz.

*Hakluyt Society.*—It would be a serious omission on such an occasion as the present, and in these rooms, not to call your attention to a Society which belongs so especially to our science as the Hakluyt. Although we do not expect novelties or discoveries from them, they are yet capable of conferring great benefit on our pursuits by their republication and translations of old works of travels now out of print, or only to be met with in foreign languages. I may mention that they have already published, 1, 'The Observations of Sir Richard Hawkins, Knight, on his Voyage into the South Sea in the year 1593,' and, 2, 'A Translation of Select Letters of Christopher Columbus, with other Original Documents, relating to his Four Voyages to the New World.'

*Geographical Distribution of Plants, &c.*—Besides the notice on this subject published by C. Ritter, in his 'Erdkunde v. Asien,' respecting the coffee plant and the date palm, I must mention that Mr. H. C. Watson has also published an elaborate work on the geographi-

cal distribution of British plants, entitled 'Cybele Britannica, or British Plants and their Geographical Relations.' His work, although confined to a small portion of the earth's surface, is valuable inasmuch as it points out how much there is to be done on this subject, one so intimately connected with physical geography, and to which the attention of A. Von Humboldt and others has been so successfully directed.

*Geographical Nomenclature.*—Our late Secretary, Colonel Jackson, has addressed a letter to M. Jomard on the important question of simplifying geographical nomenclature; entirely coinciding in the views already put forth by that writer. Of the importance of such a measure there cannot be a second opinion, the inconvenience of the present system is self-evident, when each country adopts peculiar forms and measurements, different terms and methods of description, and when even the writers of one country do not all agree in the expressions intended to define certain positive facts; it is not difficult to imagine the discrepancies which must constantly arise, not to say the impossibility of reducing their observations to one common form. But it is easier to point out the evil than to devise a remedy, and I fear the aspirations of those who recommend these measures, will be deferred until we enjoy the advantage of one common language and one universal form of a monetary system.

#### CONCLUSION.

Having thus endeavoured to lay before you a comprehensive view of the progress of our science during the past year, I cannot but feel conscious that, notwithstanding the length to which it has extended, I have made many serious omissions, and that much remains to be said upon some of the most important subjects of our science in its higher and more scientific branches, such as the progress of magnetism and meteorology, terrestrial physics and astronomy, all of which are now brought within the immediate province of the geographer, and are become some of his chief qualifications; but they require to be dealt with by a master hand. Much also remains to be said respecting the application of geography to the moral wants and political and social education of mankind. It would be a serious evil to imagine, as I fear however is the case with many, that the science and aspirations of geography are completed, when we have attained a perfect delineation of all the continents and oceans of the globe, with their bays and islets, their rivers and their mountains, and have correctly fixed the position of all those physical features which constitute the surface of our earth. Such, indeed, is but the commencement of our labour. The most correct and perfect

maps are but the skeleton or groundwork of our science, taken in the higher and more extended sense in which we wish to see it cultivated. Its application to the progress and development of civilization, and of the animal and vegetable productions of the earth, to the distribution of the different races of the human family, and the various combinations which have arisen from their repeated intercourse, are subjects of the highest consequence, and for the clear understanding of which our maps and charts can only serve as the foundation-stone. No doubt the commercial intercourse of mankind is facilitated and kept up by these maps and charts; but we aim at a higher object, viz., the improvement of man's moral culture by a more extended knowledge of the various productions of different climes, and by bringing before him on a large tabular scale the moral and physical condition of his race. To such purposes as these, maps have, with few exceptions, been as yet but rarely applied; but the movement has begun, and let us hope that the object will now not be lost sight of. That the Royal Geographical Society of London should assist in promoting such an object must be the first wish of its friends and its supporters. But to do this, its influence must be extended, its members must be increased, the sphere of its utility must be enlarged. The colonies and possessions of Great Britain extend to every quarter of the globe. Her ships navigate every shore, and her sons are foremost to explore every corner of the globe. In no country, then, are there such facilities for amassing and collecting geographical information. Let us hope that the Royal Geographical Society, encouraged as it must be by the practical and positive evidences of public support, will speedily find the means of arranging and systematising this mass of information in such a manner as to meet the requirements of the public, and to fulfil, in part at least, the original intentions of its founders.

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MISCELLANEOUS.

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# PAPERS READ

BEFORE THE

## ROYAL GEOGRAPHICAL SOCIETY.

I.—*Journal of a Steam Voyage to the North of Baghdád, in April, 1846.* By Lieut. J. T. JONES, commanding the Hon. East India Company's Steam-ship 'Nitocris.' Read March 8, 1847.

[The orthography of the Author of this Paper has not been strictly adhered to, but it has been made nearly to correspond with that of the map in vol. ix. of the Society's Journal, which will serve to illustrate the following voyage.—ED.]

THREE years having elapsed since our former ascent of the Tigris above Baghdád, and anticipating, from the early rise of the water, a more favourable season and better success than we experienced before, arrangements were made for ascending the river early in March; but our departure was unavoidably delayed until the 2nd of April, when the river had become considerably more rapid, from the high rise having already set in. We left Baghdád on the above day, and, passing through the bridge of boats, reached Turumbah and Kádhimein, the former at 10·35, the latter at 10·55.

The banks of the river at this time presented a beautiful appearance, the gardens exhibiting a diversity of trees of variously-tinted foliage, and a delightful fragrance pervading the air from the now opening orange-blossoms. At 1·45 arrived at Sheri'at el Beidha, on the right bank; 2·33 Tel Kúsh, a mound on the right bank, bore W. The country to the N. of Tel Kúsh, between Khán Suweidiyah and the river, is known by the same name as the Khán; but the Khán is also sometimes termed Tarmiyah, from a lake situated in an old bed of the Tigris called Shat el Aidhá. This is now dry, and is reported to be of the same width as the present river. 5 P.M. Khán Suweidiyah bore W. and Jedideh E.N.E. Many mounds of considerable size are to be seen S. of Khán Suweidiyah, probably the Tel Kheir of Lynch's map, but I searched in vain for the S. end of the Shat el Aidhá, which is represented as joining the present river near this spot.\* I am informed, however, that it is lost in the desert near this. Arrived at the Khán Jedideh at 5h. 3m., but finding the stream very rapid, proceeded on for twenty minutes, and anchored near the old Khán of the same name.

The gardens to the N. of Baghdád terminate abruptly about two miles above Kádhimein on the right bank, but on the left,

after leaving Moáldhem, scattered villages and date-groves are seen as high as Tel Kúsh, whence to Jedideh the country, at present, is highly cultivated with wheat and barley. On both banks mud enclosures are met with every two or three hundred yards, in which the cattle used for the purposes of irrigation are kept; while numerous round isolated towers, affording shelter from marauding parties, attest the weakness of the present Government. The old adage of "the sword in one hand and the plough in the other." is here literally verified.

*April 3rd.*—Left our anchorage at 5.38 A.M., the river having risen during the night 8 inches, with a cold northerly wind, therm  $43^{\circ}$ . Passed the villages of Howeish and Mansúriyah, the former at 6h. 40m., the latter at 8h. 15m., when it bore E. on the right bank and W. of Mansúriyah. The Tarmiyah, or ancient canal, leaves the Tigris, and another large canal, bearing the same name, and said to be of more ancient construction, is seen about  $1\frac{1}{2}$  mile below. This has been long dry, but the northern canal, during the period of high water in the river, still receives a portion of the Tigris, and is lost in the marshes W. of Kaðhimein. Its direction by compass was observed to be  $244^{\circ}$ . The river near Mansúriyah is broad, but broken by islands. A khiyát, or wall, is situate a little to the N. of the Upper Tarmiyah, having an old khán in ruins close to it. 9h. 11m. passed Sa-déyah village and grove of date-trees, the country every mile becoming more elevated and the valley of the Tigris beginning to assume a distinct form. Reached the village of Sindíyah at 10h. 33m. and received twelve hours' fuel. Remained here until noon to obtain observations, which place the village in lat.  $33^{\circ} 52' 50''$ . The whole of the gardens and date-groves from Jedideh to this place are irrigated by the Khalis Canal, which, with the Dujel, are the only canals of importance that the Páshálic can now boast of. A sad picture for contemplation is afforded by the remains of so many noble works of the same kind lying scattered around neglected and abandoned, showing at a glance, without the aid of history, the once flourishing state of this celebrated country.

Left Sindíyah at 12h. 10m. P.M. and at 1h. 35m. observed it to bear  $137^{\circ}$ . At this spot the high cliffs, forming the valley of the Tigris, abut on the left bank of the stream, and the large canal of Nahrawán is seen above them about a mile and a half distant, trending to the S.E. From this point the river runs in a more westerly direction, and at 3.10 passed some cliffs (about 50 feet high), on the summit of which a part of the Nahrawán is observed to have been cut away by the force of the current encroaching on and undermining the soil on which it stands. The cliffs forming the right bank of the river are distant from

this spot about 5 miles. A long alluvial deposit projects from them to within 100 yards of the left bank. This space only is now occupied by the river. The tomb of Imám Sayyed Moḥammed bears from this point  $262^{\circ}$ . This also is the general direction of the river 'A'dhem. The river of Nahrawán is also known here by the name of El Dojúí. At 3h. 35m. anchored off a small branch of the 'A'dhem to obtain observations.

The western branch is larger and 2 miles distant from this; it now appears a considerable stream, though when I passed it in March, 1843, it deserved little notice, but the heavy rains of the last winter have increased its importance. After passing the 'A'dhem the river becomes more tortuous: a long reach extending to the S.W. leads to an opening of considerable extent, which is said to be the mouth of the Shat el Aïdhá, and supposed to be the old bed of the Tigris. We passed it at 6h. 15m., and stood towards Khán Tholiyah, in a northerly direction. Anchored for the night at 6h. 32m. P.M. near two islands which here bisect the stream.

The alluvial soil here gives place to banks of pebbles and shingle, occasionally mixed with conglomerate masses, but the high cliffs still exhibit alluvium mixed with many strata of sand and, in some places, red clay. A salt stratum is observed near the present margin of the stream, in which sprigs of the tamarisk flourish, but the rest is bare and much eroded, not only by the Tigris, but by the numerous torrents which find their way from the high lands contiguous to the Hamrín range. The ḥawís, or alluvial deposits formed in the valley of the Tigris, are now in a high state of cultivation. Obtained observations both for longitude and latitude; the latter, deduced from the merid. altitude of Antares, was found to be  $34^{\circ} 0' 19''$  N.

*April 4th.*—At sunrise took several bearings. From this station the mouth of the old bed of the Tigris or Shat el Aïdhá bears S. by E.  $1\frac{1}{2}$  mile distant, which would make the bottom of the reach S. of Khán Tholiyah in lat.  $32^{\circ} 59'$  nearly; consequently, if my latitude be correct (which I have no reason to doubt), the delineation of this part of the river in Lynch's map is scarcely carried far enough to the S. It is difficult, however, to speak with certainty, as the map in my possession is on a very small scale, reduced by Arrowsmith from Lynch's original of 12 inches to a degree. Captain Lynch's fixed stations are, however, very accurately determined. During the night the river rose 8 inches, occasioning the banks to fall in with loud reports; thermometer  $42^{\circ}$  at daybreak.

Left our anchorage at 6h. 9m. A.M. and crossed over to the ḥawí on the left bank and procured some fuel, and pursued a northerly course towards Khán Tholiyah. I may here mention a

trait of Arab rapacity indicative of their general character. Some of the Jebbur Arabs had been assisting us in carrying our fuel, and I presented them with some ball cartridge in return. Scarcely, however, had they reached the party to whom they were to have been presented when one and all made a general scramble. The person to whom I entrusted the cartridges, finding it now impossible to distinguish those who had earned them, threw them down, and such a scene ensued as could only be told by any unfortunate traveller who might fall into such hands, as assuredly his garments or any other property he might possess would be thus contended for. Swords were drawn and sticks of no ordinary dimensions whistled through the air, and, when we left them, the excitement appeared as if it would last throughout the day.

The stream as we approached the neighbourhood of Khán Tholíyah became more rapid; our progress, therefore, was proportionately slow. At 9h. 50m. the Khán bore N.E.  $1\frac{1}{2}$  mile. From this the river pursues a westerly direction to Khán Mizrakjí, and from thence to El Káim, a little more northerly; at noon Belid, on the Dijeil, bore  $182^{\circ}$ , Khán Tholíyah  $8^{\circ}$ . At 1h. a tomb in the bed of the Nahráwán, called Imám Sayyed Hosein, bore N.  $1\frac{1}{2}$  mile distant. A small branch of the Nahráwán is also here called Sidd-el-Aziz; at the above time, Belid bore  $169^{\circ}$  and Tholíyah  $99^{\circ}$ ; Khán Mizrakjí, a place of accommodation for pilgrims on the road to Samarrab, N., and at 4 P.M. N.E. This is the nearest point to the Kbáli, or Sidd Nimrud, or Median Wall. I visited it in 1843, but it is so well fixed and described both by Captain Lynch and Dr. Ross in the Journals of the Royal Geographical Society, that I need not further allude to it. 5h. 45m. came to an anchor for the night. Nothing but the greatest perseverance and attention to the steerage of a steam-vessel through such intricate passages as we have had to-day could ensure her making any progress. From Khán Tholíyah the bottom has changed to a hard shingle, over which the current runs at the rate of  $6\frac{1}{2}$  geographical miles per hour. The bed of the river is full of islands and shingle shoals, and as there is, at this season of the year, but one channel of sufficient depth, which receives the whole stream, it occasions where thus confined considerable falls or rapids, some of which, notwithstanding a heavy S.E. wind set in, enabling us to make sail, we could scarcely surmount. The engines, indeed, appear to be paralysed when on the top of a rapid, as the revolutions decrease from 29 to 23. This I can only account for by the weight of the vessel in her ascent acting against the momentum of the paddles; in fact, the small diameter of the wheels is not calculated to lift as well as to propel the vessel up an inclined plane.

The country passed through to-day was extremely beautiful. The undulating hills forming the valley of the Tigris are now clothed in their spring garments; waving grass, intermingled with flowers of every hue, forms a rich landscape which the eye is unaccustomed to meet in the alluvial plains below. Perpendicular cliffs, composed of masses of conglomerate, laid bare by the abrasion of the stream, seeming to threaten the destruction of the vessel, should they fall, are happily contrasted with their carpeted summits. The háwís of alluvium, projecting from the various points of the valley of the Tigris, are highly cultivated by the Jebbúr Arabs on the E. and the Mahjammah on the W. Obtained some good bearings and angles from the mast-head. Shortly after sunset the S. wind fell, and heavy rain followed with thunder and lightning, but before morning the sky again became clear.

At sunrise on the 5th resumed our route, contending against a heavy stream of 6 knots an hour, and occasionally slight rapids in the narrow channels. Obtained our fuel at Kádisiyah at 7h. 48m.

While taking in wood, I visited the remains of the old fortress and city of Kádisiyah, situate about 1 mile from the river. I never had so agreeable a walk. The country is literally covered with wild grass of every sort in full blossom. Flowers of every tint and hue were crushed beneath our feet, and the very air was perfumed by them. The city is of an octagonal form, with round towers at each angle, between which 16 buttresses or bastions are placed, 37 paces distant from each other. A gap exists in the centre of either side, which no doubt held the gates of the fortress, but all traces of these are now gone. The wall by measurement was originally 50 feet in thickness, and is at present about 25 feet high. Its interior face must have comprised an entire range of vaulted chambers, one of which is still uninjured, and affords a good specimen of the general structure. It is built of sun-dried bricks, 18 inches square and 5 thick. No buildings at present exist within its area; but on a minute examination, at one-third the distance across the interior from its western side, I discovered the traces of a wall which extended from the southern ramparts in a line due N. for 1240 paces. This line of wall at the distances along it of 700 and 790 paces, and at its termination, had other walls, connected with and extending from it at right angles, or due E., for 450 paces, where they break off abruptly. A perfect oblong enclosure of 250 paces long from N. to S., and 100 broad, occupied the space between the northern parallels. A high mud rampart appears to have surrounded the town, leaving a space between it and the outer defences, 70 feet wide. The great canal of the Nahrawán is seen stretching far to

the eastward, and passing within 200 yards of the N.E. angles of the fort. A band, or cut from the Nahrawán, about 1 mile N.W. of the city, watered the country between it and the Tigris, and ran along the W. face of the fortification, throwing out a branch in a S.S.E. direction, at a short distance below its junction with the Nahrawán. This offshoot entered the fort at its N.W. angle, and ran in a S.S.E. direction to the angle of the city wall, where it bifurcated, one branch passing along the N. face of the city, while the other, running parallel with the western wall for 640 paces, suddenly turned to the east through an opening in it. After supplying the town, I presume both this and the southern branch must have been employed in irrigation. It is probable indeed that the whole space between the walls of the city and the outer defences contained gardens, for no mounds of any size or extent are to be met with, which could lead us to conclude that buildings of any importance existed there.

From the S.W. angle of Kádísíyah observed bearings. There can be no doubt, I imagine, that this city was one of importance during the flourishing period of the Khalifate, and probably owes its decline and subsequent abandonment to the decay of that vast canal, the Nahrawán river. A small oblong enclosure, called El Sanam (the Idol), existed formerly on the summit of the cliffs now washed by the Tigris, but only half of it at present remains, the river having swept away the remainder; the walls, however, on the face of the cliffs, are plainly distinguishable, and, unlike Kádísíyah itself, are built of fine kiln-dried bricks; no inscription or sculptures are to be seen there. The half of a statue (whence the enclosure has its name) of black stone, similar to that of Egypt, was found here some years ago, and is now in the possession of Dr. Ross. The latitude of Kádísíyah by a meridional observation of the sun is  $34^{\circ} 4' 38''$ .

On the high land forming the western valley of the Tigris, and immediately opposite to or due W. of Kádísíyah, there are the remains of a neat square town of some extent, called Istábolát (stables). The streets and buildings can be traced by a great number of parallel mounds, and broken brick walls at right angles with each other. A ruined wall of kiln-dried bricks and a ditch surround it. The Dijeíl leaves the Tigris close to this place; its northern and more ancient mouth is now dried up. It has a S.E. direction, and after passing the end of the Median Wall and the villages of Harbah and Sumeíchah is finally lost near the Tarmiyah water. The country is now considerably more elevated.

Having got a meridian observation, we continued our course at 12h. 15m. passing the head of the Dijeíl and Istábolát, and at 12h. 45m. El Kaim. Saw a solid quadrangular tower situated at

the head of the S. branch of the Nahrawán. It is certain that this magnificent canal had two large branches, from which it received its supply of water. and by some it is imagined that a small canal, called the Nahr Háfeh, having its mouth at the foot of the Hamrin range, where it is severed by the Tigris, might be called a third. The Nahr Háfeh, however, is much smaller than the other two branches. It joins the centre one near the Kantarah el Resás, from whence this main branch pursued a S.E. direction. meeting the branch from El Káim, which flowed in a more easterly direction a little above the junction of the 'A'dhem with the Tigris. From this spot they became one united stream, considerably more elevated than the surrounding country, and pursuing an uninterrupted course S. eastward over the 'A'dhem, the Diyálah, and the present bed of the Tigris, it formerly fertilized the immense plains of Irák by its many ramifications to the neighbourhood of the Persian Gulf.

An opening to the S. of El Káim, I have since heard, is a duct from this splendid work. In March 1843, I visited the junction of the two larger branches where the remains of a "Sidd" or "band" still exist. A tower must also have stood on this site formerly, for the ground was strewn with remains of buildings, glass, and pottery. Opis is represented by some as having occupied this position, but I hardly think that opulent city could have left no further traces of its existence than the insignificant remains here met with at present.

From El Káim to Samarra the ascent of the river is very difficult. The fall or inclination of its surface is plainly visible to the eye. Opposite to El Káim a single fall took us forty minutes to overcome, and had we not been assisted with a westerly wind, which enabled us to make sail, our further progress would probably have been stopped.

Reached Samarra, April 6, at 7 A.M. The modern town, situate on the cliffs forming the left bank of the Tigris, is now encircled by a strong wall built at the expense of the influential Shiah population from India. When I visited it in 1843, this wall was just begun. The town was previously open, and suffered much from the demands of the Bedouins. They used to encamp outside and threaten to pillage the place if their demands were not complied with; it is, however, now secure and free from such visits. But a great oversight has been committed in not extending the walls to the margin of the cliffs overlooking the river, for the Bedouins could at any time destroy the aqueduct which conveys water to the town, and thus, by cutting off the supply of this necessary article, compel the inhabitants to come to terms. It is, however, on the whole, a miserable town, and owes its importance chiefly to two handsome tombs surmounted by cupolas, the

larger being that erected over the remains of the Imám Husein 'Askari. It has recently been repaired, and, I believe, was formerly covered with gold, similar to the cupolas at Kádhimein, Kerbelá, and Nyaf; it is now perfectly white, the present funds not being sufficient to give it its former splendour. The smaller cupola, or that of the Imám Mehdí, is very pretty, being beautifully enamelled with yellow and white flowers on a bluish-green ground. Mehdí was the last of the Imáms revered by the Shí'ahs, and is said to have disappeared from the earth at this spot. A large hole, over which this edifice is erected, points out the place from which it is also believed he will at some future period re-appear. It is therefore much venerated by Mohammedans, especially by the Shí'ahs. Pilgrims from all parts of Persia resort to this place annually. I am informed that 10,000 is the yearly average of the number of those who visit this sacred spot, but I am inclined to believe this amount is even under the truth. No tax is levied on the pilgrims, but the proprietors of the kháns and houses, in which they reside, pay to the government 2 Riega piastres for each individual. The modern town comprises about 250 houses, with a Sunni population slightly under 1000, who possess among them barely 100 stand of arms. The town is farmed by the government this year to the present Zábít Seyyid Husein for 280,000 Riega piastres, a sum nearly equal to 660*l.* sterling.

About half a mile to the N. of the modern town a curious spiral tower is situated. It is called the Malawiyah. I ascertained its height to be 163 feet, as near as possible. From its summit a fine view of the extent of ancient Sámarráh is obtained. Heaps of bricks, glass, pottery, and fragments are strewed in every direction, and the outlines of many edifices are plainly distinguishable. The former town is said to have been watered by a tunnel cut under ground, having its mouth in the neighbourhood of the Hamrín ranges. Traces of this tunnel are still to be seen in the remains of the wells (named Kámát or Káríz) descending into it. Both the Malawiyah and the remains of an oblong building (a Jámí' or Medreseh) close to it, are built of fine bricks, and with the greatest neatness. The Medreseh is about 810 feet in length and 490 broad, having 12 buttresses between the corner bastions on its N.W. and S.E. faces, and 10 on its N.E. and S.W. sides. The great entrance faces the Kéblah, and shows at once its Mohammedan origin. A fountain appears to have existed in the centre of its court. Its walls are at present about 30 feet high, and on its S.W. side the remains of arched windows are discernible. To the N.N.W. of the Malawiyah, about 2½ miles distant, are the remains of the Palace of Mótasim, the eighth Kaliph of the Abbasides. Its entrance is now all that is left standing. The ruins around occupy a large space, and have vaulted chambers beneath

them. Many an idle tradition is attached to these subterranean apartments by the Arabs, and, moreover, Beckford's 'Vathek' owes its origin to this place. During our visit to it in 1843 we descended into the vaults by means of a rope and block, much to the dismay of the frightened natives, who would not trust themselves near the spot, but awaited the termination of our enterprise with a superstitious dread. They firmly believe that a lion has chosen this place to hold his court in, and when we again made our appearance on "terra firma" scatheless, they thanked God for our deliverance. The vaults are of some extent, and cut out of the limestone rock, but have brick roofs. A few scraps of old and much rusted iron and a fathom or two of decayed rope rewarded our labours.

The site of the ancient Sámarráh was undoubtedly well chosen. The broad and rapid Tigris bounded it to the W., the S. branch of the Nahrawán extending from the Kantarah-el-Reşâş to the river 'A'dhem on the N., and the N. branch of the Nahrawán extending from Al Kâim in an easterly direction to its junction with the other branch on the S., thus enclosing a triangle of rich land, whose longest side was 35 English miles, and the remaining two 20 miles in length. Many towns occupied this area, and the numerous canals, offshoots from the great Nahrawán, crossing it in a diversity of lines, attest its former cultivation. At this time not a blade of grass or a single tree breaks the monotony of the extensive view from the top of the Malawiyah; a death-like silence prevails around the fallen city, interrupted only by the howling of a jackal, who has just issued from some of its deserted vaults.

W. by N. of the palace, and on the undulating mounds which form the right boundary of the valley of the Tigris, another ruin, apparently of the same character and date, is seen. The buttresses, which occur at regular intervals along the walls, and are partly standing, give to the whole, when viewed at a distance, the resemblance of a group of columns. These buttresses are circular or square pedestals neatly built of fine brick-work. It is called "Ashik," or "the lover." Some high mounds in the valley of the river, about half way between the palace and this ruin, or rather nearer to the latter, mark, I think, the site of some very ancient ruin, probably Babylonian. The Arabs, however, call them "Máshúkeh," or "the beloved;" and a bridge over the Tigris is said to have formerly connected them together, notwithstanding which, tradition has here preserved a tale similar to the well-known feat of Leander.

About four miles N. of the modern town of Sámarráh, a high tumulus stands in the plain. It is called Tel Alij, or the "nose-bag mound," and is said by tradition to have been raised by some former ruler ordering his troops each to bring the nose-bag

of his horse full of earth for this purpose. It exactly resembles the tumuli to be met with in Syria and in the plains of Shahrazü, near Suleimániyeh.

6th.—At 9h. 55m. A.M. left Sámarráh, and had hardly proceeded an hour before we grounded on a pebbly shoal. From Sámarráh to this place we had been struggling hard against the violence of the stream, and had nearly surmounted a fall of water over a shoaly spot, when, the engines losing their power, the vessel's keel touched the ground, and in an instant she was thrown on the bank, with her port broadside exposed to a stream running nearly 7 geographical miles per hour. I have been many times aground both in the Upper Euphrates and in this river, but in a worse position than this I was scarcely ever placed.

The shore was 290 yards distant, and the dropping of anchors in the stream, from long experience was known to be useless. as, from the hardness of the bottom, they came home with the slightest strain. After 6 hours' hard labour, we succeeded in getting an anchor buried on shore, and a chain of 150 fathoms attached to it brought off across the rapid stream to the vessel. We now thought the heaving-off certain, and were congratulating ourselves on our success, when the chain snapped in two, and the vessel swung round with a heavy crash as if her bottom was stove in, her head down, and the starboard broadside now receiving the whole weight of the stream. We tried in vain to connect our chain again during a heavy squall of thunder, lightning, and rain, and at length desisted for the night. During the night the stream forced the lee side of the vessel higher up on the bank, while the weather side heeled over to starboard into deep water, occasioned by the heavy current acting against the vessel, and cutting or abrading away the bank below us. At daylight the port side of the vessel was nearly dry, while the water was within 18 inches of the starboard scuttles, and had we remained much longer in this position, she might have turned over, or perhaps filled when the water reached them. At dawn of day, however, we were again at work, and happily succeeded in connecting the chains. From that time till 1h. 20m. P.M. we hove at intervals a heavy strain, by which the vessel righted, and eventually came off the ground by allowing the stream to catch her on the opposite quarter.

Part of the Shammár Arabs under Nejiris are roaming about this part of the country, as are the Āl Bú Hamed (family or tribe of Father Ahmed). Large herds of their camels are grazing around, and enjoying the rich grass which abounds everywhere at this season. Some of the tribe approached the vessel when aground, and a Bedouin I have with me was sent to beg them to offer no molestation to our crew while burying the anchors on shore. Two of the party were present at the affray in which

Suleimán Mírzá lost his life, and in which our friend Tímúr was severely wounded by a spear which passed through his lungs. They inform us that the person who slew Suleimán Mírzá, by severing his head from his body at one blow, met his death a few days afterwards from an Ajeil Arab when they attacked a caravan. They also profess to regret the circumstances attending the attack on the Princes, and say they have not known "good since." Their chiefs have been killed, "and their children have died, their favourite mares are barren and suffering from disease, and happiness has left their homes." Some English iron, I believe, belonging to Messrs. Lynch and Co., of Baghdád, was offered to us for sale, for a mere nothing. This had been plundered from a caravan a few months previously, and a common bottle taken from some of Suleimán Mírzá's party was tendered to us for the exorbitant price of 2 gházis (about 8s.). The former offer, I replied, I could not accept, as I too had iron for sale, and pointed to the 9 lb. shot, which Sayyed told me caused some amusement. The latter I did not want, and offered them as many as they wished for, which soon lowered the price of their commodity. These people appear to be the terror of Al-Jez'irah from their lawless habits. The Shammár, though feared, are much less dreaded.

8th.—The river rose 3 inches last night. We weighed at 6 A.M. with cloudy weather and a S. wind, which, should it freshen, may assist. At 7h. 17m. "Ashik bore W. three-quarters of a mile distant; Kahf-el-Kelb, some high mounds S. of "Ashik, 201°; Sámarráh 137°; Malawiyah 129°, with the mounds of Masbukah nearly in a line with it; the palace 112°. The river from this point trends more to the N.E. for a short distance along the cliffs forming the eastern boundary of the valley of the Tigris, thence N. to Shmás, some modern ruins which extend a considerable distance to near Abú Delif, a miniature repetition of the Malawiyah, which we passed at 11, a moderate S. wind materially promoting our progress. At 1h. 10m. we arrived opposite the mounds of Mehjir and the Kantarah-el-Reşas, signifying "the bridge of lead," and although not actually a bridge, in our acceptance of the word, but a dam to confine the water in the dry season, it might have answered both purposes, or the name may be more probably modern and brought into use only since the decay of the canal.

Many encampments of the Shammár on the right bank near Haweishlát were passed. They extend nearly up to Mosúl. These people are, however, migrating towards Baghdád, as Sufúk, the chief Sheikh, advances to the S. The parties of Nejris and Sufúk are not now on friendly terms, owing to the Páshá of Baghdád (Nejib) having invested the former as sheikh of the tribe, while the latter claims it as a right. Ahmed-el-Kádí (a connec-

tion by marriage of Sufúk) informed me this morning that the 'Abeid once possessed the whole of Northern Mesopotamia, and that the present Shammár usurped the country. He says:—"Two Shammár families, with their tents, originally wandered from Nejd, and after some time encamped with the 'Abeid. Among the chattels of the new comers a wooden bowl of extraordinary dimensions was observed, but it excited no further curiosity till the strangers invited some of the then holders of the soil to a feast, when the bowl was set before the guests filled with mutton, butter, and the usual ingredients of Arab fare. The dinner was duly despatched, and the 'Abeid, on returning to their tents, were talking of the munificence of the strangers and the unusual dimensions of the wonderful bowl. A greybeard of the tribe who had not been at the feast listened in silence for some time, when starting up, to the dismay of his friends, he demanded that the newly arrived strangers should be immediately put to death, adding, with the air of a prophet, that the famous bowl told a story in itself, and that ere long many strange fingers would be dipped into it. It literally happened as the old man had foretold. His voice was over-ruled in the assembly, and the strangers' lives were spared. A few months afterwards Shammár after Shammár arrived and feasted from the much-dreaded bowl. A few years sufficed for the total expulsion of the 'Abeid, and instead of being lords of the soil, that once powerful tribe became Felláhs and slaves to the formidable Shammárs." Such was Ahmed's account of the origin of the Shammárs in Mesopotamia, but nevertheless the 'Abeid are still powerful enough to render themselves obnoxious to the government. They at present occupy the country opposite Tekrit, and, I believe, now never cross into Mesopotamia.

At 3h. 15m. the tomb of Imám Mohammed Dúr, at Dúr, bore E. In shape it is a cone, similar to that of the tomb of Zobeideh in Baghdád, on a square base. The village is a collection of miserable houses on the undulating mounds which form the E. margin of the valley of the Tigris, and boasts of a small minaret. Mr. Rich appears to identify this spot with the plains of Dura mentioned in Scripture. The river opposite to the village is divided into numerous narrow channels, through which it flows at a very rapid pace. We came to an anchor about one mile above the village.

The inhabitants soon assembled. The Páshá's letter was presented, and received with every mark of respect. After a short consultation, a boisterous fellow was called for, with hands stained with indigo; he was a dyer by trade, as well as a Mulláh and teacher of the youth of Dúr. The letter was handed to him to read aloud, for the satisfaction of his auditors, who formed a circle round him. Thrusting his right hand into his pocket, which was

capacious enough to hold any one of his scholars, he produced a pair of spectacles, and, fixing himself in a commanding position, vociferated forth the contents of the missive at the full pitch of his stentorian voice. When he concluded, a buzz of applause signified the approbation of the assembly and their willingness to act in any way I might require.

To the E. of Dúr, about  $1\frac{1}{2}$  mile, there is a high tumulus named Tel Benát, or the "daughter's mound." It is similar to the Tel Alj, and can be seen at some distance off, from its insulated position on the plain. Between it and the village there are many lime-kilns. Lime is here found in great quantities, and Baghdád is chiefly supplied from this place; it is conveyed on rafts down the Tigris. I remarked that the inhabitants here generally appear sickly, and sore eyes seem to afflict the greater part of the community. Some of the women were very pretty and fair, and evinced no alarm at coming near the vessel.

9th.—We continued our ascent. The river above this place is new to us, not having gone beyond Dúr when we attempted the ascent in 1843. Indeed, had we not been favoured with a strong wind, I fear our present attempt would have been attended with the like disappointment. At 10h. 50m. a small enclosure in the háwí, on the left bank, bore E. two miles; it is called Khán Jozám, and affords protection to the cultivators when threatened by plundering parties of the 'Abeïd or Shammár. The tomb in Dúr bore, at the above time,  $157^{\circ}$ ; the river from Dúr to this place is known by the name of the Khán, and is much intersected by islands, which render the main channel extremely sinuous. Our ascent so far has been one continued struggle against a rapid stream with falls every half-mile, which the vessel can scarcely overcome. Progressing steadily against these difficulties, we arrived opposite Sheri'at el Wójá, a landing-place formed by a gap in the cliffs on the W. side of the Tigris; from this Dúr bore  $149^{\circ}$ ; caravans here halt for water. At 7 P.M. we anchored at Tekrít, and received a visit from its Governor, Mustafá Efendí, who put the resources of the town at our disposal, and rendered us much service by placing at our command several Khavvases, without which we could scarcely hope to complete the supply of fuel for the vessel, the crowd around being so great.

In the evening I walked to the top of the cliff on which the old citadel stood; it bears evidence of former strength, and, being naturally almost inaccessible, must have been completely so when fortified. The front facing the river is quite perpendicular, and exhibits horizontal strata of stiff clay, red earth, fine sand, and conglomerate, in successive layers from the water's edge to its summit; this is the general formation of the cliffs bounding each

side of the valley of the Tigris, from Sámarráh to Tekrít. This insulated cliff is about 130 yards long by 70 broad, and in height 86 feet from the water's edge; but the fragments of the former buildings scattered over its summit increase it to 100 in its highest part. Large massive bastions of lime and pebbles, faced with solid brick-work, are still remaining round the cliff, between which the wall once stood. On the S. face, between the citadel and the modern town, and half-way down the cliff, two buttresses, of the same construction as the bastions, point out the situation of the gateway; the bricks which faced them have been carried away. A deep ditch, about 30 yards in breadth, but now filled up with rubbish, conveyed the water of the Tigris around the base of the citadel, thus completely insulating and rendering it impregnable, before artillery was known. S. of this, on another detached hill, stands the modern town, formerly girt round by a wall which has fallen to decay; it contains at present about 300 miserable houses and 1000 inhabitants, but the space formerly occupied by the ancient town is of great extent. Some ruins called Kanísah ('Church') are still shown. A few years ago, when Sufúk, the Shammár sheikh, invested the town, a trench was dug by the inhabitants for defence; in it many earthenware urns and sepulchral vases were found, one of which, in the possession of Mulláh Rejeb, spoken of by Dr. Ross in his Journal, I with difficulty procured from the owner. It is surmounted by figures of men and birds, of a curious but rude execution, and is probably Babylonian. The modern town has two mosques, but no minarets; the streets are kept free from filth, and altogether have an appearance of cleanliness and order seldom seen in Eastern towns.

I am told, on an emergency, 400 matchlocks and guns can be collected for the defence of the place, and am inclined to believe that this is rather under than above the true amount. It is certain that the Tekrítis have maintained their position against the Arabs, and even compelled the powerful sheikh of the Shammárs to relinquish his intended assault on the place, by the menacing attitude they assumed.

Mr. Rich, in speaking of this place in the flourishing times of Dávud Páshá, states that it was then farmed for 22,000 Constantinople piastres annually, and that it boasted at that time of 600 houses. I presume this must be a mistake; for at present, though its dwellings are but half that number, and its population proportionably small, from the effects of the plague and other causes, the proprietor or farmer pays yearly to the government of Baghdád a sum three times as large as that mentioned by Mr. Rich; 68,000 Constantinople piastres, or a sum equal to about 600*l.*, is the amount paid this year. Great complaints are made by

the Tekrítís against the government, and on account of the present unsettled state of this part of the country. Fear of the Shammárs on the one side, and the 'Abeid on the other, have prevented the townspeople from extending their cultivation to its usual limits, and the consequence is, the rich land lying between Tekrít and the Hamrín hills is now a perfect waste. The inhabitants are all Mohammedans, with the exception of one solitary Jew, who is on the staff of the governor, and whose life is not to be envied. To the question of "What have you in Tekrít?"—"One barren date-tree and an infidel Jew," was the reply.

During the night I obtained a mer. alt. of  $\alpha$  Scorpii, from which I determined the latitude to be  $34^{\circ} 35' 45''$  N.

Having got observations for regulating the chronometer, and despatched a messenger to Músul with letters to the Vice-Consul, and directions to communicate with Sufúk, to whom I addressed a complimentary epistle, we left Tekrít at 9h. 40m. A.M. A new pilot, or rather an old one (for I believe he is upwards of 70 years of age), was shipped as our guide above this place: in fact, he is the same individual who piloted the "Euphrates" under Lynch seven years ago. He declared, after having been on board an hour, and witnessed the performance of the vessel against the current, that she could not pass the rapids, which the "Euphrates" found a difficulty in ascending. Indeed, what he says will, I fear, prove true, for our progress to-day has been considerably slower than yesterday, and in many places amounted almost to a standstill. At 4h. 15m. P.M., having a long reach full of difficulties ahead, and no hope of passing them before night came on, we brought to an anchor in the only secure spot to be met with in this neighbourhood.

From Dúr the principal channels appear to be confined to the western part of the bed of the Tigris; but below that place the main body of the stream passes along the eastern cliffs. The lat. was determined this evening by a merid. alt. of Dúbhe  $34^{\circ} 41' 52''$ , thus making our whole day's progress, of  $6\frac{1}{2}$  hours' steaming, equal to  $6' 7''$  of nothing only.

11th.—At 6h. 14m. A.M. we weighed; but, in coasting, the stream caught our bow, and there not being room, from the narrowness of the channel, to bring the vessel's head up stream with the helm, we dropped an anchor in hope of checking her speed, but without effect, from the hardness of the bottom. We consequently drifted down a considerable distance before we could get her head round, and did not reach the place whence we started till 6h. 45m. The anchor, too, on heaving it up, was found to have lost its stock. The boats were sent with a party of men to track up while the vessel ascended the rapid, which she did with tolerable ease. We steamed up to a bluff point of the cliffs on

the W. side of the river, called 'Abdul Kerím, from the tomb of an old Imám, now in ruins, standing on its summit. Hauled alongside the bank to wait for the boats, which came through an inlet or khaléj (channel). Observing a party of Shammár horse-men making towards the boats, we sent an armed detachment to prevent their molesting the trackers. on which they retreated. The boats having joined us at 9h. 20m., we steamed on. The river rose 16 inches between sunset and daylight, causing a greater rapidity in the current. It is hereabouts divided into many channels by well-wooded islands. 12h. 20m. we reached Kubar (tombs) on the left bank, near a high mound in the plain, and the first tamarisk grove met with N. of Baghdád. The channel is very winding to Kāleh Abú Reyyásh.

At 4 P.M. the Kāleh bore W.; it is a ruined fort on the cliffs, with a fine plain, or háwí, extending eastwards from it. The edge of the river from Tekrít to Khán Kharnéinah is now entirely peopled by the Shammárs, and all communication between Tekrít and Músul is in consequence stopped. They have vast herds of camels and sheep, which are seen grazing with their beautiful horses on this rich plain, dotted here and there with black tents, affording a pleasing picture of pastoral life, did not the character of the tribe contrast sadly with its primitive habits.

At 5 P.M. brought to for the night near the Eastern bank. Our whole progress to-day, as deduced from the latitude determined by an altitude of Dúbhe to be  $34^{\circ} 49' 43''$ , has been but  $7' 51''$  Northwards. The river rose 3 inches during the night.

12th.—We left our anchorage at 6 A.M., and struggled hard against the rapid stream till 9, when we were opposed by a fall. The ascent of this, not 100 feet in extent, occupied us till 11h. 20m. It was only overcome at last by the aid of a South wind, and by sending our boats to track up in-shore. 12h. 30m. passed a ruined Khán named Kharnéinah, situate under the cliffs on the W. side of the valley. These cliffs now diverge considerably more to the W., while those forming the Eastern boundary of the valley of the Tigris trend more to the E., leaving abrupt and broken angles at Kharnéinah on the W., and at a point called Legleg [Stork] on the E. About 3 miles immediately N. of Legleg, the remains of the Nahr Háfi, or upper branch of Nahráwán is seen. It is said to have conveyed the waters of the Tigris under the cliffs through a tunnel, to the main branch at Kantarah el Resas; another small canal or feeder is situate about 2 miles S. of the same point. From the diverging points described above the country is more open, and undulates in gentle slopes to the foot of the Hamrín range. From Khán Kharnéinah the river is very winding, and is divided by numerous beautiful islands, covered with every species of wild plants, as well as tamarisks and

poplars, some of which have attained to a considerable size, and afford a precarious livelihood to the inhabitants of Tekrít, who carry the timber on rafts to Baghdád for sale.

After leaving Kharnéinah our progress was a little more rapid, owing to the fine southerly wind which continued till sunset, when we made fast for the night at an island about three miles below "el Fet-hah," or the "opening," where the Tigris breaks through the hills. The latitude here observed was  $34^{\circ} 56' 57''$ , and the northern mouth of the Nahrawán bore N.E. 1 mile distant. The continuation of the Hamrín hills on the W. side of the Tigris, termed Jebel Mak-húl, is now end on, and bears N.N.W.  $\frac{1}{2}$  W. The eastern ridge, or that termed Jebel Hamín, extends from a little above this point S.-Eastwards, and is an incongruous heap of barren mounds, composed of sandstone and pebbles, without a blade of vegetation. Both the Hamrín and Jebel Mak-húl are of similar formation, and may be reckoned about 500 feet high at this spot, though their altitude decreases as they advance to the S.E. The rich plain at their base forms a pleasing contrast to their desolate summits. During the night the river fell 6 inches. Thermometer from  $50^{\circ}$  to  $85^{\circ}$  in the shade.

13th.—Left our station at 5h. 45m., and, not being favoured as yesterday with a S. wind, advanced at a snail's pace to our dépôt of wood, which we reached at 7 A.M. It had been cut in a small tamarisk grove, just above the mouth of the Nahr Hafii, and covered in with branches, to prevent its being set on fire by the Arabs. Here we remained, writing and despatching answers to letters just received from Baghdád, till 9h. 30m., when we made a fresh start, but, as I had anticipated, with little or no success. Struggled hard against the stream, which here breaks through the hills with much force, till 11h. 20m., when we were brought to a stand-still, without any hopes of accomplishing our object; and, on considering that our success hitherto had been mainly attributable to fresh S.E. winds, while obstacles of a much more formidable nature than those hitherto encountered awaited us, besides the risk we ran of grounding and eventual detention, should the water fall after having risen to so great a height, I reluctantly determined to retrace my steps to Baghdád, and accordingly put the helm up.

The last day's journey has been through a rich country, covered with wild plants of almost every description; undulating slopes of an emerald green, enamelled with flowers of every hue, are spread before the eye like a rich carpet at every turn of the stream; and nothing is wanting but the hand of man to turn such a profusion of nature's bountiful gifts to account. But all is a vast solitude. The silence is unbroken except by the rushing of the torrent past the time-worn cliffs, or

by the screeching of an owl awakened from his slumbers by the flap, flap, flap of our paddle-wheels. When Mr. Rich passed this spot, some twenty years ago, all was bustle and activity, Arab tribes were encamped upon the banks of the river, and the beautiful islands, rich in their spring-garments, were the abode of peaceful husbandmen. The ruthless Shammárs have since that time, through the feebleness of the Turkish government, spread devastation wherever they pitched their tents; and, thinned by the plague which assailed the Pashálik in 1841, the former inhabitants have been obliged to flee to the more secure districts in the neighbourhood of Kerkúk.

The rapidity with which we are now descending, after our hard struggle upwards, appears to gain fresh impetus every mile. Rocks and islands, steep cliffs and shingly banks, quickly succeed each other; cattle, tents, and men are passed in a single hour, and the silent desolation of yesterday is exchanged for the noise and activity of a well-peopled country. The following table will show the rapidity with which we advanced:—

|                             | P.M.     |
|-----------------------------|----------|
| Khán Kharnéinah . . .       | 0h. 52m. |
| Anchorage of 11th April . . | 1 15     |
| Kaleh Abú Reyyásh . . .     | 1 30     |
| Tekrit . . . . .            | 3 20     |

thus descending in 3h. 50m. through a distance which had taken 30 hours in our passage upwards. Between 'Abd el Kerim and Kaleh Abú Reyyásh a small stream or torrent falls into the Tigris on the left side. It is named Nahr Milh (Salt river), and is said to be of considerable size in the winter months, when swollen by the torrents from the Hamrín range.

14th.—Reached Sámarráh at 9h. 9m. A.M., and remained there during the day to make arrangements for sending our overplus fuel to Baghdád by rafts. In the evening I visited the Malawíyah, and from its summit obtained several bearings.

15th.—Left Sámarráh at 6h. 21m., and steamed down the river against a heavy S. wind, which in the reaches directly opposite to it raised the waters of the Tigris into a considerable swell.

Anchored off the gardens of Turumbah in a heavy squall of thunder, lightning, hail, and rain, at 6h. 20m. The next morning we took up our old berth at Baghdád, after passing through the bridge of boats.

From these observations it will be seen that the journey northward against the stream occupied  $86\frac{1}{2}$  hours steaming, while the descent was performed in the short space of 19 hours.

I much regret the termination of our trip; for I had flattered myself that it might not only prove useful in a geographical sense, but be also both instructive and amusing. I had contemplated,

could I have only reached the neighbourhood of Músul, a visit to that town and the adjacent ruins of the Assyrian cities of Nineveh, Khorsábád, and Nimrud, as well as a minute examination of the interesting Al Hadhr, so graphically described by my friend Dr. Ross; and I feel the disappointment the more, as I have already been six years in this country without ever having had such an opportunity, my duties not permitting me to absent myself from the vessel for a length of time such as would be required to perform the journey by land from Baghdád.

The failure of this attempt is not to be attributed to any severe obstacles met with in the navigation of the Upper Tigris; for to a vessel possessing the power of those now running on the Thames, of an average speed of 10 knots per hour, such difficulties as the Nitocris experienced would be deemed of minor importance. The Nitocris, indeed, under the most favourable circumstances in still water, cannot exceed the speed of 8 knots per hour, having a wheel of 12 feet diameter only, and a short stroke of 30 inches. It can hardly, therefore, be deemed a matter of surprise that she should have failed to contend against a stream of  $6\frac{1}{2}$  geographical miles per hour, with occasional falls, when it is considered that she carried above one month's provisions and 18 tons of fuel, besides the guns, matériel, and men, on the present expedition.

When I left Baghdád I hoped for, but did not anticipate success. I am therefore not disappointed. We have at all events to congratulate ourselves on having ascended to the Hamrín, whereas our former journey, having the same objects in view, terminated at Dúr from an insufficiency of water.

The bearings throughout these notes are true, excepting where expressly mentioned by compass.

*Bombay, 26th July, 1846.*

## II.—*On the best Means of reaching the Pole.*—By Admiral F. WRANGEL.

[Read April 12th, 1847.]

THE vast accumulation of ice—which covers the northern seas in immense fields, high hills, and small islands—subjects the navigator in these waters to incessant danger and anxiety: to struggle with the elements, to overcome obstacles, to be familiarized with dangers—all this is so habitual to the seaman, that he is sometimes even dull without it. The continual, uniform, and quiet navigation in the regions of the trade-winds excites in the sailor a desire for change: he encounters a squall with joy, welcomes even a storm in the seas beyond the tropics not without a certain

pleasure; and, confident in his skill, in the activity and indefatigable energy and experience of his crew, in the strength of his vessel and soundness of all her parts, he does not fear the terrible powers which so often put to the trial all his patience and all his coolness. Such being the ordinary feeling of the seamen, it is not astonishing that the Frozen Ocean has long attracted the navigators of all nations, but in particular those of England—that country which has an indisputable right to be regarded as the first of all maritime nations. Without taking into consideration the great number of whalers, who have carried on their trade among the mountains of ice in the most remote latitudes of the Atlantic, England has sent out fifty-eight distinct expeditions to discover a shorter passage to the Pacific, either by the N.W. or N.E. channel, from the time of John Cabot (1497) to George Back (1836): not one of these has been crowned with complete success.

In all those enterprises, however, one common aim, not specified in the instructions, has ever been kept in view; and this aim has been more or less attained by every successive attempt—the maintenance of the spirit of enterprise and the support of a laudable national pride, in the attainment of the laurels of disinterested exploits, for the advantage of science, trade, and navigation—the true sources of power and glory to every maritime people.

When, after nearly three centuries and a half, scientific men, and even navigators, were persuaded of the improbability of the existence of a N.W. or N.E. passage to the Pacific, practicable for trade, the evident aim for new enterprises was transferred to the invisible point of the earth—the North Pole. The expedition of Captain Buchan, and the fourth voyage of the indefatigable Parry, were undertaken expressly with that view.

This question, supported by the celebrated Barrow, has been again moved in England, and has resulted in the exchange of opinions on this subject between navigators and scientific men.

Captain Sir William Edward Parry, in a letter, dated the 25th of November, 1845, to Sir John Barrow, proposes in a short outline a new plan for the expedition. Following the principles there traced, a party would not, he thinks, meet with any of the difficulties encountered by Parry himself in the latitude of  $82^{\circ} 45' N.$ , or about  $2^{\circ}$  to the N. of the extreme point of Spitzbergen, which was the starting-point of the Polar Expedition. Having unequivocally assigned as the chief causes of failure in those attempts—to which, however, no others can be compared with respect to the difficulties overcome—1st, the broken, uneven, and spongy state of the ice, covered with snow; and, 2ndly, the drift of the whole mass of ice in a southerly direction—Captain Parry proposes, in order to avoid these unfavourable circumstances, that the ship employed in the projected expedition should winter

at the northern point of Spitzbergen, and the party particularly designed for the attainment of the Pole should leave the vessel in April. About 100 miles north of this point there should be previously prepared a store of provisions, so that the party, at the commencement of its journey, should not be too heavily laden; and about the time of its return, according to the reckoning of Parry, in the course of May, there should be sent out another detachment with provisions to meet it about 100 miles further from the place where the ship is wintered. Captain Parry founds his hopes of success on the supposition that, in April and May, the party would proceed about thirty miles a-day along the ice, which would then offer an immovable, solid, and unbroken surface. He also thinks it advisable to provide the expedition with reindeer.

Finding it difficult to make these ideas of Captain Parry accord with those which I entertain respecting the state of the ice and the circumstances indispensable to success in travelling along its surface, I beg leave to express my doubts, and submit my ideas on this subject.

Expeditions were undertaken in the years 1821, 1822, and 1823, in the Siberian Frozen Sea, from two points of departure, distant one from the other, in the direction of the parallel, more than 1000 miles, viz. from the mouths of the rivers Lena and Kolyma. These expeditions occupied an interval from about the end of February to the beginning of May (O.S.), and the state of the ice does not at all seem to have been such as Captain Parry supposes it to be, to the north of Spitzbergen, in the course of April and May (N. S.).

Lieutenant (now Rear-Admiral) Anjou was stopped by thin and broken ice moving in different directions, in

|                      |  |  |
|----------------------|--|--|
| 1821. April 5 (O.S.) | at the distance of 20 Italian miles from the nearest shore | } N. of the island Kotelnoy.                   |
| 1822. March 22.      | 22 Italian miles   |  |
| „ April 14.          | 60 „   | } E. of New Siberia.                           |
| 1823. Feb. 28.       | 59 „   |  |
|                      |  | { N. of the islands at the mouths of the Lena. |
|                      |  |  |

The expedition commanded by the author, which took its departure from the mouth of the Kolyma, encountered the same impediments:—

|                   |                      |                            |
|-------------------|----------------------|----------------------------|
| In 1821. April 3, | at 120 Italian miles | } N. of the nearest shore. |
| „ 1822. „ 12,     | at 160 „             |                            |
| „ 1823. March 23, | at 90 „              |                            |

But on the 27th of March the masses of ice, which were separated from each other by large channels of open water, were driven about by the wind and threatened the voyagers with destruction.

My hypothesis is founded on the above facts, collected during a three years' navigation in a sea whose depth is not more than 22 fathoms, and which is, so to say, landlocked to the S. by the Siberian coast, and there defended from the winds and waves over a space of  $180^{\circ}$  of the compass; whereas the sea on the meridian of Spitzbergen has a considerable depth, and is exposed to the swell of the whole Atlantic. Therefore I cannot concur in Captain Parry's hopes that the ice can be in a state favourable to the execution of a journey towards the N. in April and May.

Captain Parry's calculations as to the possibility of advancing thirty miles a-day seem to imply the employment of reindeer, and would render it necessary to provide the expedition with those animals: we must, therefore, conclude that that officer expects to obtain the necessary rapidity by the assistance of rein-deer. If I am warranted in this supposition, I must remark that rein-deer are far from being capable of advancing over the uneven surface of the ice, and are besides too weak to carry heavy burdens.

Sir John Barrow, in his work '*Voyages of Discovery and Research within the Arctic Regions*,' &c., publishes the above-mentioned letter of Captain Parry, disapproving, however, his proposed plan, and anticipates greater success in the enterprise by accomplishing it in small sailing-vessels, fitted with the Archimedian screw (like the ships '*Erebus*' and '*Terror*'), and steering northward on the meridian of Spitzbergen: in other words—Barrow proposes the repetition of the former attempts, notwithstanding their failure, expecting success from more favourable circumstances. But here a question is naturally suggested—may there not exist means of reaching the Pole other than those which have been hitherto resorted to—means not liable to the various inconveniences already encountered during the several expeditions undertaken from the coasts of Siberia towards the N. upon the surface of the ice, and which must be encountered in proceeding on foot, as Captain Parry proposes?

The last Siberian expeditions were executed in a particular kind of sledges, called "*Narty*," drawn by dogs. The expedition, undertaken from the mouth of the Kolyma, travelled in this manner in 1823 (from the 26th February to the 10th May) 1533 miles, of which the greater part was along the shore towards the island of Kolutchin, seen by Captain Cook during his navigation in a N.W. direction from Behring's Straits. We proceeded upon the ice along the shore very successfully, but as soon as we left it the difficulties and impediments increased. If the coast of Siberia had a direction parallel to the meridian, the Kolyma expedition would have travelled  $11^{\circ}$  of latitude in one direction and the same in returning; therefore, if the point of departure had been the  $79^{\circ}$  of N. latitude, the expedition might have reached the Pole and returned to its starting-point.

The utmost limits of the coast of Greenland towards the N. remain yet unknown; but the meridian direction of its mountains and coasts allows us to suppose that, in proceeding along them, it is possible to approach the Pole nearer than from any other direction, or even to reach that point.

The northernmost point of Greenland, Smith's Sound, seen by Captain Ross, is in latitude  $77^{\circ} 55' N.$ ; and in latitude  $76^{\circ} 29'$ , and on the island Wolstenholme, there is a village of Esquimaux. Taking all this into consideration, my opinion may be expressed in the following plan:—The ship of the expedition should winter near the Esquimaux village, under the 77th parallel, on the western coast of Greenland. There should be previously despatched to this point, in a separate party, at least ten party, with dogs, and active and courageous drivers; the latter the same, if possible, as were employed in the Siberian expeditions,\* likewise stores and provisions in sufficient quantity. In autumn, as soon as the water freezes, the expedition should go to Smith's Sound, and from thence further towards the N. On arriving at  $79^{\circ}$ , it should seek on the coasts of Greenland, or in the valleys between the mountains, for a convenient place to deposit a part of the provisions.

In February the expedition might advance towards that place; and in the beginning of March another station, two degrees further N., might be established. From this last point the Polar detachment of the expedition would proceed during March over the ice, without leaving the coasts, keeping along the valleys, or on the ridge of mountains, as may be found most expedient, but deviating as little as possible from the line of the meridian, and shortening the distance by crossing the straits and bays. A part of the men, dogs, and provisions, should await their return at the last station.

The expedition, to reach the Pole and to return, must traverse in a direct line nearly 1200 miles, or, including all deviations, perhaps not above 1530 miles, which is very practicable, with well-constructed sledges, good dogs, and proper conductors.

If the most northern limits of Greenland, or the Archipelago of Greenland Islands, should be found at too great a distance from the Pole, and the attainment of that point seem impossible, the expedition might at any rate draw up the description of a country hitherto absolutely unexplored, and would, even by so doing, render an important service to geography in general.

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\* The success of such an enterprise would chiefly depend on the kind of dogs, the experience and courage of the conductors, and the form of the sledges. It certainly will not advance rapidly if Esquimaux or Tchouktschi dogs are employed, because these are entirely unaccustomed to such long journeys; nor with Esquimaux or Tchouktschi drivers,—men without courage or activity.

III.—*Note on the Paper of Admiral the Baron von Wrangel on the best Means of reaching the North Pole.* By Sir JOHN BARROW, Bart.

WHATEVER proceeds from Admiral von Wrangel, who is a practical officer, is entitled to attention; few men have had more experience of danger on an icy sea than he has had, but in a different quarter of the world, and under different circumstances, to those who have prosecuted northern discoveries in the Arctic Regions. As a geographical problem of great interest, a visit to the North Pole would afford a most desirable solution; and, in these days of adventurous discovery, I should not despair of its accomplishment, though I shall not live to see it.

I entirely agree with the Baron as to the doubts he entertains of Captain Sir Edward Parry's plan of proceeding over "an immoveable, solid, and unbroken surface of ice." I believe that no such thing is to be depended on; the state of the ice, from what I have seen in the Spitzbergen Sea as high up as  $80^{\circ}$  N., is constantly changeable, and dependent on the direction and force of the wind; and the only chance, in my opinion, of reaching the Pole by the navigation of that sea would be by taking advantage of the immense pools of open water which every strong wind gives rise to: but as to the *screw*, I should not recommend the adoption of it in the ice until we know the result of the experiment now trying in the *Terror* and *Erebus*. If the land of Greenland ceases to the N. at or about the 80th degree, it is by no means improbable that an expansive basin of open water may surround the Pole; and, if so, circumstances would lead us to the conclusion that, in the absence of land, there would also be an absence of ice.

The success which the Baron and others have met with in the Siberian Sea, between the mouths of the Lena and the Kolyma, a thousand miles or more, by proceeding in sledges on firm ice along the shore, which extends the whole distance in an easterly and westerly direction, affords no means of advance towards the Pole, which causes Von Wrangel to express something like a regret that the coast of Siberia had not been made to extend N. and S., which in that case would have reached the Pole; but it should be considered that with a change in the direction of the line of coast would also occur a change of circumstances. As far as my knowledge extends, the N. and S. winds in the Arctic Regions are the most powerful, and disturb the ice much more than those which blow from the E. and W.; and I should rather conclude that if the Baron had succeeded in changing the direction of the Siberian coast to N. and S., the state of the ice, instead of being firm and fixed as he found it, would have become,

in its new position, like that on the E. coast of Greenland, a line of heavy and rugged masses, which neither sledges, nor dogs, nor reindeer could travel over.

When Captain Clavering took Lieut.-Col. Sabine along this coast for the purpose of swinging a pendulum, he proceeded in a sailing vessel as high up the coast as the latitude  $75^{\circ} 12'$ , and saw a high point, which he named Cape Philip Broke, in latitude  $76^{\circ}$ ; beyond which we know nothing. That it runs up much higher we know from the opposite coast in Baffin's Bay, the head of which extends to between  $77^{\circ}$  and  $78^{\circ}$  N.

So that on either coast of Greenland our knowledge is very limited, but extends so far, as the Baron observes, "to allow us to suppose that, in proceeding along them, it is possible to approach the Pole nearer than from any other direction, or even to reach that point."

With regard to the plan of Von Wrangel, I cannot venture to give any opinion, being in utter ignorance of the nature of sledges, dogs, and drivers; I only know that they are capable of doing wonderful things. He says, that in autumn the expedition should go to Smith's Sound, and from thence further towards the N.; on arriving at the 79th degree it should seek, on the coasts of Greenland or in the valleys between the mountains, for a convenient place to deposit a part of the provisions. As to going to  $79^{\circ}$ , and further in Smith's Sound, the Baron seems not to be aware that nothing whatever is known of Smith's Sound beyond the opening, which is supposed to be its mouth. That the expedition should keep along the coasts or in the valleys, and, as much as possible, not deviate from the line of the meridian, is no doubt most advisable; and we are assured that, "to reach the Pole, and to return to the stations, the expedition must traverse in a direct line nearly 1200 miles, and including the deviations not above 1530 miles, which is very practicable with well-constructed sledges, good dogs, and proper conductors."

I cordially agree with the Baron's concluding paragraph:—

"If the most northern limits of Greenland, or the archipelago of Greenland islands, should be found at too great a distance from the Pole, and the attainment of that point seem impossible, the expedition would at any rate draw up the description of a country hitherto absolutely unexplored, and would even by so doing render an important service to geography in general."

After all, where an icy sea is to be encountered, give me a couple of strong, roomy, well-built sailing vessels, well stored with provisions, so that all concerned, during the most inclement weather, may have substantial houses over their heads.

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IV.—*Journal of an Expedition undertaken by the Messrs. Gregory, in the months of August and September, 1846.* The party consisting of A. C., F. T., and H. C. GREGORY, four horses, and seven weeks' provisions.

[Read December 13th, 1847.]

*August 7th, 1846.*—LEAVING Mr. Yule's farm at Boyeen Spring, we passed Capt. Scully's, at Boltart Spring, at 10 h. 15 m. A.M. From this place, steering a course N. 70° E. (mag.), over sandy downs thinly timbered, at 50 m. P.M. crossed a small stream trending in the direction of our course, till 2 h. 0 m., when it turned to the S. At 3 h. 50 m. halted for the night on the bank of a small stream trending to the S.W.: lat. by observation 31° 12' 10" S., long. by account 116° 50' E.

*8th.*—At 7 h. 5 m. A.M. resumed a course N. 70° E. At 8 h. 15 m. crossed a grassy granite ridge of hills, after which the country was scrubby till 9 h. 30 m., when we entered a grassy flat timbered with casuarina. At 10 h. 25 m. the country became open and scrubby; at 45 m. P.M. observed a small lake, bearing N. 10° E.; steering for the lake, at 2 h. 10 m. arrived at the western side and halted till 3 h. 15 m., when we resumed our former course, N. 70° E., through a swampy country. At 4 h. 50 m. halted on the eastern side of a shallow fresh-water lake, about 1¼ mile in length and 1 mile in width.

*9th.*—At 7 h. 35 m. A.M. steering N. 95° E., through a scrubby country, with wooded valleys; at noon observed several shallow lakes to the N.E., about 5 to 10 miles distant; at 3 h. P.M. turned to the N.E., and at 3 h. 30 m. N.; at 4 h. arrived at an immense samphire swamp, or rather plain, studded with many shallow salt-lakes; on the edge of this plain we found some good grass, and a native well of good and apparently permanent water, where we bivouacked: lat. by observation 31° 2' 22", long. by account 117° 23' 15".

*10th.*—Having marked a tree (Lat. 31° 2' G.), we left our bivouac at 7 h. 35 m. A.M., and, steering N. 95° E., passed several large salt lagoons, in a thick swampy country; at 9 h. 15 m. entered a gum-forest with close underwood, which rendered travelling very slow and difficult. At 11 h. 20 m. the country became more open, but with thick scrub. At 1 h. 0 m. P.M. observed several lakes to the N.N.E. and N.E., about 6 or 7 miles distant; we then entered a succession of dense thickets and patches of gum-forest, till 4 h. 25 m., when we turned N., and at 5 h. 30 m. halted in an open grassy patch surrounded by swampy thickets: lat. by observation 30° 58' 47", long. by account 117° 45' 10".

*11th.*—Started at 7 h. 25 m. A.M., steering N.E., through a

gum-forest; at 8 h. 30 m. changed the course to N.  $95^{\circ}$  E.; at 10 h. 15 m. the country became more open; at 11 h. 35 m., on ascending an elevated ridge, we saw several bare granite hills to the eastward; steering for the nearest, which bore N.  $75^{\circ}$  E., we arrived at the summit at 1 h. 40 m., and halted for the remainder of the day, there being an abundance of grass and water.

12th.—Leaving our bivouac at 7 h. 30 m. A.M., steered N.  $122^{\circ}$  E., through alternate patches of gum-forest and underwood with grass. At 11 h. 50 m. we arrived at the summit of a bare granite hill; from this spot we could see Lake Brown, bearing from N.  $93^{\circ}$  E. to N.  $103^{\circ}$  E.; Eaglestone Hill, N.  $100^{\circ}$  E., and several other remarkable peaks and hills. Leaving this hill at 0 h. 15 m. P.M. we steered N.  $58^{\circ}$  E. over an undulating wooded country, with several small watercourses trending to the southward; and at 4 h. 30 m. bivouacked on a scrubby hill, with a small pool of water on a granite rock. Lat. by observation  $30^{\circ} 59' 54''$ , long. by account  $118^{\circ} 17' 0''$ .

13th.—At 7 h. 30 m. A.M. resumed our course, N.  $58^{\circ}$  E., through a level gum-forest till 9 h. 40 m., then through spearwood till 10 h. 15 m., when we entered an immense thicket with a few patches of gum-forest; this continued till 1 h. 25 m. P.M., when we came to a native well among some flat granite rocks; after this a level gum-forest continued till 3 h. 30 m., when it became scrubby, with dense thickets and patches of gum-forest. At 4 h. 40 m. we halted at the foot of a granite hill, with plenty of water and grass among the rocks.

14th.—Starting at 10 h. 35 m. A.M., and steering N.  $41^{\circ}$  E. through a level country, with thickets of acacia, cypress, and eucalypti, with some grassy patches, at 2 h. 20 m. P.M. made a bare granite hill, with large shallow pools of water on the top. We bivouacked at the foot of the rocks, in an open grassy patch.

15th.—Leaving our bivouac at 7 h. 15 m. A.M., and steering N.  $50^{\circ}$  E., at 8 h. 50 m. crossed a steep rocky ridge of white sandy rock resting on granite; after this the country was grassy, with little timber, till 10 h. 30 m., when we entered a thick scrub; at 11 h. 0 m. observed a high granite hill bearing N.  $53^{\circ}$  E. At 2 h. 50 m., ascending a small tree, observed a very remarkable range of rugged hills about 40 miles distant, the highest summit of which bore N.  $57^{\circ}$  E.; at 3 h. 30 m. the thicket changed to scrub, with a few trees. At 4 h. 15 m. came on a small water hole in a granite rock, and halted for the night. Lat. by observation  $30^{\circ} 31' 43''$ , long. by account  $118^{\circ} 52' 20''$ .

16th.—At 7 h. 15 m. A.M. resumed our march on a course N.  $68^{\circ}$  E. through a well-wooded grassy country till 9 h. 35 m., when we ascended a rich grassy hill composed of fragments of trap rock. From this hill several others were seen of a similar charac-

ter to the southward; to the northward numerous large dry lakes occupied the valley, along the southern declivity of which we had been travelling since we left Lake Brown. At noon, struck the southern shore of one of the lakes; the banks were composed of gypsum and red sand; in some parts they exceeded 30 feet in height; following the shore of the lake to the S., and then E. till 1 h. 15 m., we again resumed our course N.  $56^{\circ}$  E. through dense thickets of acacia, with patches of forest consisting of gum and cypress trees, the soil a red sandy loam, nearly destitute of small vegetation.

17th.—At 6 h. 50 m. re-commenced our journey, steering N.  $50^{\circ}$  E. till 6 h. 55 m., when we passed a narrow samphire flat trending E. and W.; changing our course to N.  $63^{\circ}$  E., at 7 h. 35 m. crossed a deep watercourse trending to the S.W. At 8 h. 15 m. ascended a trap hill with a few granite rocks at the foot, among which we found a few small pools of rain-water; here we remained for three hours to refresh our horses, and then proceeded N.  $40^{\circ}$  E. till 2 h. 20 m., when we arrived at the foot of the highest hill on the range, for which we had been steering the previous day; leaving our horses we ascended the hill, which was composed of trap rock, striped red and black, and did not exceed 300 feet in height above the general level of the country; from the summit several similar ranges of trap hills were visible, extending from N. to E.S.E. To the S.E. the country appeared to be a level sandy desert, without the least appearance of vegetation; numerous native fires were visible to the W. and N. The extremely level character of the country between the ranges of hills to the E. and N., and the immense columns of red sand or dust which the numerous whirlwinds raised to the height of 200 to 500 feet, gave but small hopes of obtaining water in that direction. Returning to our horses at 4 h. 20 m. we steered for a small patch of grass, which had been seen from the hill, bearing N.  $350^{\circ}$  E., about  $3\frac{1}{2}$  miles distant; here we found a small watercourse trending to the W., with rich soil on its banks, but the grass was evidently suffering from extreme drought. Lat. by observation  $30^{\circ} 12' 28''$ , long. by account  $119^{\circ} 16' 10''$ .

18th.—After 6 h. ineffectual search for water we were compelled to return to the watering-place of the preceding day.

19th.—At 7 h. 20 m. left the bivouac, and proceeding N.  $275^{\circ}$  E. through a scattered gum-forest, with much underwood, at 9 h. 55 m. came on a dry salt lagoon, crossing which at 10 h. 12 m. passed a native well among large, flat, granite rocks; ascending gradually at 11 h. 50 m. we arrived at the top of the hill, which was crowned with steep white cliffs 20 to 30 feet high; the course was then changed to N. through a dense thicket till 12 h. 20 m., when we resumed our former direction through a well-wooded

country. At 3 h. halted on a high granite hill, with some patches of grass, and abundance of water in the hollows of the rocks. Lat. by observation  $30^{\circ} 19' 33''$ , long. by account  $118^{\circ} 54' 45''$ .

20th.—At 7 h. 30 m. A.M. resumed a westerly course through a succession of dense and almost impassable thickets of acacia and melaleuca.

21st.—At 7 h. 45 m. A.M. left our bivouac, steering N.  $320^{\circ}$  E. over an undulating country, covered with thicket and patches of gum and cypress forest.

22nd.—Started at 7 h. 35 m. A.M., steering N.  $275^{\circ}$  E. through a succession of thickets, gum-forest, and patches of scrub. At 12 h. 30 m. observed a granite hill bearing N.  $315^{\circ}$  E., and, turning in that direction, at 2 h. 15 m. made the hill, and, finding some excellent grass around a native well, halted for the remainder of the day to refresh our horses. Lat. by observation  $30^{\circ} 3' 36''$ , long. by account  $118^{\circ} 7' 45''$ .

23rd.—At 7 h. 40 m. A.M. started in a direction N.  $320^{\circ}$  E. over a thinly timbered and at first scrubby, but changing gradually to a grassy country. At 10 h. 5 m. altered the course to N.  $336^{\circ}$  E. At 1 h. 5 m. P.M. gained the summit of a high granite hill; from this a succession of dry lakes trending to the N.E. were visible, and a very remarkable hill, N.  $312^{\circ}$  E., distant about 35 or 40 miles; turning towards this hill, through an almost continuous thicket, at 4 h. 20 m. halted at the foot of a high sandstone cliff, with some deep holes which still retained a small quantity of water.

24th.—Left our bivouac at 7 h. 35 m. A.M., and steering N.  $312^{\circ}$  E. passed over nearly a level country, timbered with cypress and gum, with dense thickets of brushwood. At 2 h. 40 m. P.M. bivouacked at a deep water-hole in a flat granite rock: lat. by observation  $29^{\circ} 42' 31''$ , long. by account  $117^{\circ} 41' 30''$ .

25th.—At 7 h. 20 m. A.M. resumed our journey, keeping in the same direction as on the previous day. At 9 h. 15 m. came on an extensive samphire flat extending as far as the eye could reach to the N.E. and S.W. We determined to attempt crossing it, as it did not appear to be more than 3 miles wide where we struck it; after traversing the samphire flat for an hour, we arrived at the dry bed of the lake which occupied the N.W. side of the valley; the ground at first appeared very firm, but having proceeded about half a mile, the hard crust of gypsum and salt which formed the surface gave way, and three of the horses were bogged almost at the same moment. The horses being quite exhausted by ineffectual struggles to extricate themselves, we proceeded to the opposite shore of the lake (about half a mile distant) and constructed a pair of hurdles of small trees, with the assistance of the tether ropes and canvas saddle-bags; placing these alternately in front of the horses, after six hours' continued exertion we had the satis-

faction of finding ourselves once more on *terra firma*, and observing a bare granite hill bearing N.  $81^{\circ}$  E., about 3 miles distant, steered for it, and at 6 h. 30 m. p.m. bivouacked at the foot, where we found some grass and pools of water on the top of the rocks. Lat. by account  $29^{\circ} 37' 30''$ , long. by account  $117^{\circ} 38' 10''$ .

26th.—From the summit of this hill we had an extensive view, the lake extending about 10 miles to the E., 12 to the S., 15 to the W., and 8 to the N., but to the N.E. by E. the lake formed the visible horizon; shallow pools of water a mile and upwards in extent, and low wooded and high rocky islands, were scattered over this vast expanse of salt, gypsum, and white mud. At 8 h. 35 m. a.m. started in a direction nearly S. along the shore of the lake, in hopes of turning the lake to the W. At 10 h. 40 m. turned N.  $221^{\circ}$  E., and at 12 h. 30 m. halted on a grassy granite hill, with a deep water-hole in the rock, about 1 mile from the lake. Lat. by observation  $29^{\circ} 47' 13''$ , long. by account  $117^{\circ} 35' 45''$ .

27th.—At 7 h. 40 m. steering a general course of N.  $200^{\circ}$  E., at 8 h. 40 m. again made the shore of the lake, and, following it, at 9 h. 20 m. it turned S.E., and at 9 h. 45 m. to a general course of N.  $80^{\circ}$  E., until 15 m. p.m., when we halted for an hour and a half under a very remarkable solitary white gum-tree. We then turned N.  $173^{\circ}$  E. till 2 h. 20 m., when the course was changed to N.  $204^{\circ}$  E. till 3 h. 30 m., when we left the lake (which trended to the west), and steering N.  $250^{\circ}$  E., at 5 h. 5 m. bivouacked at a native well in a small grassy valley. Lat. by observation  $29^{\circ} 59' 4''$ , long. by account  $117^{\circ} 39' 0''$ .

28th.—Starting at 7 h. 35 m. in a W.N.W. direction, at 8 h. 45 m. passed some small dry lagoons. At 9 h. 20 m. ascended a granite hill. From this we discovered that we were on a peninsula formed by two branches of the lake, and that farther progress in this direction was impossible; the lake continued to trend S. and formed the horizon in that direction. At 9 h. 40 m. we turned to the eastward; and at 11 h. 35 m. struck the southern extremity of the eastern branch of the lakes. Following the shore nearly E., at 12 h. it turned N.E.; at 20 m. p.m. N.  $17^{\circ}$  E.; and continuing this course at 1 h. left the lake. Crossing extensive open downs, at 2 h. 5 m. passed a dry lake on the right, and entered thickets of brushwood; at 2 h. 30 m. changed to a gum and cypress forest till 3 h. 0 m., when we came to a grassy hill, with rich soil, and quartz and granite rocks. After this we again entered the thickets. At 3 h. 45 m. the country became open and grassy; and at 4 h. 0 m. we attained the summit of a granite hill, from which there was an extensive view. On the N. side of this hill we found a native well in a fine grassy patch, and bivouacked. Lat. by account,  $29^{\circ} 45' 15''$ ; long. by account,  $117^{\circ} 45' 40''$ .

29th.—At 7 h. 45 m. a.m. left the bivouac, and steered N.  $30^{\circ}$  E.

through dense thickets; at 8 h. 30 m. crossed our track of the morning of the 24th; at 9 h. 15 m. crossed a dry salt lake trending to the N.W. and S.E.; at 25 m. p.m. changed the course to N.; at 1 h. to N.  $37^{\circ}$  E.; at 1 h. 35 m. ascended a granite hill, on which we found a few small pools of water.

30th.—At 7 h. 35 m. A.M. resumed our journey N. over a level country with brushwood and grass; at 10 h. 35 m. ascended a steep grassy ridge, and found ourselves at the N.E. extremity of the immense lake which for five days had baffled all our attempts to proceed N. and W. The lake at this part was about 6 miles wide, and to the S.E. extended to the horizon; on the N. and W. there were many bare granite hills. At 11 h. 0 m., descending the ridge, we crossed a level flat covered with brushwood, and steering N.  $328^{\circ}$  E., at 12 h. 15 m. it became grassy, and ascending a grassy granite hill, halted at 12 h. 55 m. for the remainder of the day to refresh the horses. Lat. by observation,  $29^{\circ} 17' 56''$ ; long. by account,  $117^{\circ} 46' 40''$ .

31st.—Leaving our bivouac, at 7 h. 30 m. A.M. steered N.  $328^{\circ}$  E. for two hours, through thickets of cypress, gum, and acacia. The country then improved, became more open and grassy, with jam-wattle. At 10 h. 55 m. ascended a granite hill, and changed the course to N.  $357^{\circ}$  E.; at 11 h. 30 m. attained the summit of a high bare granite hill. From this we observed many similar hills to the N. and E.; a remarkable range of trap hills to the N.N.E., and about 30 miles distant; while from N.  $281^{\circ}$  E. to N.  $302^{\circ}$  E. were many trap ranges from 12 to 30 miles distant. Descending the hill at noon, we directed our course to the nearest range, which bore N.  $302^{\circ}$  E., traversing a level plain covered with brushwood, with some grass. At 4 h. 45 m. crossed a dry stream bed, trending to the W.; and at 5 h. 5 m. bivouacked on a granite hill, with some grass, and a fine pool of water in the rock. Lat. by observation,  $29^{\circ} 3' 14''$ ; long. by account,  $117^{\circ} 30' 40''$ .

1st September.—At 7 h. 45 m. A.M. resumed our journey, and at 8 h. 45 m. arrived at the hill we had been steering for on the previous evening. The summit commanded an extensive view: to the W. were many dry salt lakes and ranges of trap hills; on the N. the country was level for several miles, and then rose into a low range of granite hills, covered with brushwood and grass. Having taken bearings to the principal summits, at 9 h. 20 m. descended the hills, and steered N.  $230^{\circ}$  E. for some miles. The country was covered with dense thickets of acacia; at noon it was more open and grassy, with granite rocks; at 1 h. 5 m. passed several irregular dry salt lagoons; at 3 h. 30 m. halted at the foot of a granite hill with good grass, and water oozing out of a cleft in the rock. Lat. by observation,  $28^{\circ} 50' 44''$ ; long. by account,  $117^{\circ} 20' 10''$ .

2nd.—Leaving our bivouac at 7 h. 40 m. A.M., steered N.  $330^{\circ}$  E.

over a succession of granite hills, with acacia and grass. Several small watercourses trending westward occupied the valleys. At 12 h. 40 m. came on a party of four natives, who immediately decamped, leaving their spears, shields, &c. behind in their haste to escape. Observing a high and somewhat remarkable summit bearing N.  $312^{\circ}$  E. about 20 miles distant, we steered for it; the country still continued grassy and covered with brushwood, but was more level. At 3 h. 5 m. turned N. to a steep granite hill; at 3 h. 30 m. crossed a dry stream bed, 30 yards wide and 15 feet deep, trending to the N.W.; at 4 h. 10 m. halted in a gully in the granite hill, and obtained water by digging among the rocks. Lat. by observation,  $28^{\circ} 34' 9''$ ; long. by account,  $117^{\circ} 2' 10''$ .

3rd.—Started at 8 h. 0 m., steering towards the hill seen the previous day, and which now bore N.  $307^{\circ}$  E. The country was nearly a dead level, with a few small dry stream-beds trending to the S.W.; the soil a red loam, producing brushwood and grass. At 10 h. 50 m. came on an extensive salt marsh or dry lake, which extended to the foot of the hill we were steering towards. At 12 h. 25 m. gained the summit. From this spot the salt marsh appeared to extend about 15 miles to the N.E., and a branch to the N.W. In that direction the water appeared to trend in wet seasons, but the dip of the country was so slight as to render it uncertain; to the N. a range of trap hills 5 to 10 miles distant intercepted the view; to the E. the granite hills continued to trend in a northerly direction. Having completed our observations at 2 h. 10 m., started in a direction N.  $300^{\circ}$  E. along the N.E. foot of a rugged range of trap hills; at 3 h. 50 m. passed a dry lake on the right; and at 5 h. 15 m. bivouacked in a patch of fine oat grass on the side of a trap hill. From the summit of the hill near the bivouac we could see the salt marshes continuing in a N.W. direction. All the hills within 20 miles appeared to be of the trap formation, and therefore gave no prospect of finding any water. Lat. by account,  $28^{\circ} 24' 20''$ ; long. by account,  $116^{\circ} 42' 20''$ .

4th.—This morning we held a council, when it was determined that, as the horses had been 24 hours without water, and no prospect of obtaining a supply to N. or W. (there having been no rain for more than a month), it would be advisable to return to the well at our last bivouac to refresh; and then, by a westerly course, attempt to make the sources of the Hutt or Arrow-smith river. We accordingly started at 8 h. 10 m., and, after a smart ride of 6 hours, arrived at our bivouac of the 2nd.

5th.—Left at 7 h. 20 m. A.M., steering N.  $240^{\circ}$  E.; at 8 h. 15 m. crossed the large dry stream-bed, which here trends W. At 11 h. 0 m. ascended the ridge of trap hills which bounded the valley on the W. At 12 h. 0 m. found a small pool of water in a

gully trending to the W. After this we traversed an acacia thicket, with narrow strips of cypress forest, till 5 h. 50 m., when we bivouacked.

6th.—At 6 h. 45 m. A.M. ascended a granite hill, near the top of which we found a native well, where we halted at 7 h. 30 m. At 9 h. 0 m. resumed our journey over granite hills covered with brushwood and cypress, with some patches of good grass. At 11 h. 10 m. passed a native well; then steering W.N.W., we crossed three small water-courses, trending to the N.W.; and at 1 h. 15 m. halted in a patch of good grass at the foot of a bare granite hill, on the top of which we found a fine pool of water. Lat. by observation  $28^{\circ} 50' 51''$ ; long. by account  $116^{\circ} 29' 0''$ .

7th.—Started at 7 h. 15 m.; steered N.  $255^{\circ}$  E., through thickets of acacia; at 10 h. 5 m. crossed a narrow strip of salt marsh, which spread into a dry lake to the S. After leaving the lake the country became more grassy, until 11 h. 30 m., when we entered a dense thicket of acacia, cypress, and eucalyptus. The country rose gradually till 4 h. 0 m., and then descended till 5 h. 25 m., when we crossed a small watercourse trending S.

8th.—Leaving our bivouac at 7 h. 0 m. A.M., we steered N.  $275^{\circ}$  E. At 7 h. 20 m. crossed a rich grassy granite hill; we then turned W.N.W. to a similar hill, where we halted half an hour to look for water; our search being unsuccessful, at 9 h. 30 m. we resumed a westerly course through alternate thickets and grassy gum forests till noon, when the soil changed from red loam to ironstone gravel; the grass disappeared and was replaced by scrub; the country was much broken, and continued to rise till 4 h. 0 m.; it then rapidly descended till 4 h. 30 m., when we struck a small watercourse trending S. Following the stream downwards for half a mile, we found a pool of water and an open patch of grass, and halted for the night, having travelled nearly 50 miles without obtaining water. Lat. by account  $28^{\circ} 58' 50''$ ; long. by account  $115^{\circ} 45' 10''$ .

9th.—At 7 h. 30 m. resumed a westerly course through a grassy gum forest; at 8 h. 0 m. crossed a large watercourse, trending S., with many shallow pools; at 9 h. 10 m. passed a granite hill, and entered a rich grassy valley timbered with gum and jam-wattle, with a small watercourse trending N.: the ridge on the W. of the valley was destitute of timber, but covered with thickets of acacia and scrub. At 10 h. 0 m. turned N.  $305^{\circ}$  E., and at 10 h. 35 m. came on the head of a small stream-bed with water in pools; following it to the W.N.W., at 11 h. 30 m. it was joined by a running stream of brackish water, 4 yards wide, from the N.E.; the stream turned S.W. We then left it, and steered W. over an open scrubby country; at 12 h. 30 m. entered a dense thicket of eucalypti and acaciæ, the soil composed of fragments of granite

and trap-rock; at 1 h. 0 m. entered a deep valley by an abrupt descent, and found ourselves again on the bank of the stream, which was now much enlarged, and running through a narrow grassy flat, backed by sandstone cliffs 80 to 100 feet in height. Followed the river W. till 1 h. 55 m., when it turned N.; at 2 h. 30 m. it turned N.W., at 3 h. 5 m. the banks of the stream became very high, and stratified in a singular manner: the thin strata of the lower rocks being inclined and dipping to the E., while the superincumbent red sandstone was nearly horizontal. We entered the bed of the stream, and upon examination two seams of coal were discovered, one about 5 and the other 6 feet in thickness, with several beds of shale and sandstone. Having pitched the tent and tethered the horses, we commenced collecting specimens of the various strata; we succeeded in cutting out 5 or 6 cwt. of coal with a small axe, and, in a short time, had the satisfaction of seeing a fire of Western Australian coal burning cheerfully before the tent. Lat. by account  $28^{\circ} 57' 10''$ ; long. by account  $115^{\circ} 30' 30''$ .

10th.—At 7 h. 20 m. followed the river, the general course of which was N.  $250^{\circ}$  E.; at 7 h. 40 m. crossed to the left bank: the valley became wider and the soil of a much better quality, being formed of decomposed bituminous shale and gypsum, producing luxuriant oat and rye-grass; at 9 h. 10 m. crossed to the right bank, and steered N.  $220^{\circ}$  E., to an abrupt headland on the N. side of the valley, about two miles wide; the soil a stiff brown loam, with rounded fragments of granite, quartz rock resembling burrstone, and flinty trap; the grass was much improved, being principally of perennial species. At 9 h. 50 m. halted on the top of the hill for 20 minutes, and then turned N.  $200^{\circ}$  E.; at 11 h. 15 m. again crossed to the S. bank, and then changed the course to N.  $235^{\circ}$  E., the grassy flats extended nearly 2 miles back from the river; at 11 h. 55 m. ascended a sandy ridge with a few gum-trees on the summit; the valley now narrowed considerably, the flats averaging half a mile in width, and backed by elevated sandy downs, producing short scrub and grass. The course of the river was now about N.  $230^{\circ}$  E.; at 1 h. 35 m. we ascended a remarkable red sandstone hill, with a table summit and steep rocks on all sides; it nearly blocked up the valley. At 2 h. 15 m. left the hill, steering a general course of N.  $242^{\circ}$  E. along the river; at 4 h. 5 m. bivouacked in a rich grassy flat, thinly timbered with a white-stemmed species of eucalyptus. Lat. by observation  $29^{\circ} 10' 42''$ ; long. by account  $115^{\circ} 15' 15''$ .

11th.—Started at 7 h. 40 m. A.M., and steering N.  $240^{\circ}$  E., crossed the river, and at 7 h. 55 m. left the grassy flat, and crossing undulating sandy downs halted at 8 h. 45 m. to ascend a steep red sandstone hill, or rather cliff, from the top of which we had a

distant view of the ocean; the river was observed  $1\frac{1}{2}$  mile to the S., and a large branch appeared to join it about 2 miles below our bivouac. At 9 h. 30 m. steered N.  $267^{\circ}$  E., over open sandy downs; at 10 h. 35 m. struck the river, running northward through beautiful grassy flats, timbered with York and white gum and wattles; there were many fine pools of water, which appeared to be of a decidedly permanent character. After an unsuccessful attempt to cross the stream from the soft boggy nature of the channel, we followed it N. till 11 h. 0 m., when it turned W.N.W.; at 11 h. 20 m. W.S.W.; at 11 h. 45 m. crossed to the S. bank; it now trended W. b. S. till 25 m. p.m., through a rich limestone valley; the river then turned W. Steering W. by S. we ascended a sandy limestone hill, with scrub and a few small *Banksiæ*; after a halt of 15 minutes, at 1 h. 5 m. left the hill, and turned N.  $248^{\circ}$  E.; at 1 h. 30 m. struck the river, and again halted for 20 m. We then followed the stream, the general course being N.  $260^{\circ}$  E., and at 3 h. 40 m. arrived at the mouth of the river, which was choked up with sand and rocks. I conceive this river to be the 'Irwin' of Captain Grey, as this spot is only  $1\frac{1}{2}$  mile S. of the position assigned to that river on Arrowsmith's chart of this part of the coast. At 4 h. 30 m. we left the beach, and retracing our steps at 5 h. 50 m. bivouacked at the spot where we crossed the river at 1 h. 30 m. Lat. by account  $29^{\circ} 15' 10''$ ; long. by account  $114^{\circ} 59' 0''$ .

12th.—At 7 h. 50 m. resumed our journey up the river, steering N.E. till 8 h. 25 m., and then E. along the N. bank of the river, through rich flats covered with fine grass, and timbered with York gum. At 10 h. 20 m. left the river and entered the sandy downs on the N. side of the stream; at 10 h. 30 m. crossed a small valley with some fine springs; at 11 h. 0 m. changed the course to E. by S., and at 11 h. 50 m. passed  $\frac{1}{4}$  mile N. of the sandstone cliff we had ascended at 9 h. 0 m. the preceding day. Altering the course to N.  $83^{\circ}$  E., at 12 h. 50 m. crossed the river, where it is joined by the S. branch, which is of equal size with the northern one. Following the southern branch, which runs through wide grassy flats backed by sand-downs, at 2 h. 0 m. halted for the remainder of the day. Lat. by account  $29^{\circ} 11' 20''$ ; long. by account  $115^{\circ} 17' 45''$ .

13th.—At 7 h. 55 m. crossed the river, and holding a course N.  $160^{\circ}$  E. over a sandy country of considerable elevation, at 11 h. 45 m. halted for half an hour, and shot a large kangaroo, which proved a welcome addition to our stock of provisions. At 1 h. 30 m. changed the course to N.  $142^{\circ}$  E., and at 2 h. 30 m. struck a running stream 3 yards wide trending to the W. This is probably the 'Arrowsmith River' of Captain Grey. Here we bivouacked, as it did not appear likely we should meet with water again for

the next 10 or 15 miles. The country on the banks of this stream is sandy, without timber, and covered with scrub, except in the bed of the river, where the grass is abundant, but rather thick with brushwood. Lat. by observation,  $29^{\circ} 27' 9''$ ; long. by account,  $115^{\circ} 27' 45''$ .

14th.—At 8 h. 35 m. left the bivouac, steering N.  $160^{\circ}$  E. over sandy downs, with ridges of red sandstone, till 3 h. 0 m., when we altered our course to N.  $220^{\circ}$  E., and, following down a valley, at 4 h. 0 m. turned W.S.W., and bivouacked at 5 h. 15 m. by a swampy patch with good grass, and water by digging. Lat. by account,  $29^{\circ} 48' 10''$ ; long. by account,  $115^{\circ} 32' 30''$ .

15th.—Leaving our bivouac at 8 h. 0 m., steered N.  $214^{\circ}$  E. through a scrubby country, with patches of white gum forest. At 9 h. 50 m. turned N.  $160^{\circ}$  E., over a sandy and ironstone country, covered with scrub, and of considerable elevation; at 3 h. 30 m. turned N.  $170^{\circ}$  E., and followed down a valley; at 5 h. 0 m. turned N.  $115^{\circ}$  E.; and at 5 h. 30 m. bivouacked at a native well in a patch of York gum.

16th.—As the only food for the horses at this place consisted of white everlasting flowers and scrub, we determined to proceed, although they showed some symptoms of fatigue; we therefore started at 7 h. 20 m., steering N.  $160^{\circ}$  E. The country was more broken by valleys than any we had passed over since we left the Irwin; the soil generally sandy, with ironstone-gravel, producing scrub, a few *Banksiæ* and grass-trees, and occasional patches of gum forest. At 10 h. 30 m. turned N.  $135^{\circ}$  E.; and at 11 h. 40 m. N.  $138^{\circ}$  E. towards a high hill about 12 miles distant; at 2 h. 20 m. turned N.  $180^{\circ}$  E., and entered an extensive piece of level sandy country surrounded on all sides by hills; at 3 h. 40 m. changed the course to S.W.; at 5 h. 0 m., one of the horses being unable to proceed farther, we were compelled to leave him, and continue our route in search of water, the only chance of saving him; at 5 h. 50 m. passed a small salt lake with some grass on the western side; at 6 h. 0 m., finding the country more scrubby and less chance of obtaining water or grass, returned to the salt lake and bivouacked at 6 h. 30 m. on the western side.

17th.—After digging in ten or twelve places around the lake, we succeeded in obtaining fresh water on the N. side; we therefore went back to the horse we had left the preceding evening, and, finding him able to move, brought him up to the well. Having an abundant supply of water and grass, we determined to rest the horses this and the following day.

19th.—Leaving our bivouac at 8 h. 5 m., steered N.  $160^{\circ}$  E., and soon ascended elevated sandy downs, with a few *Banksiæ* and *floribundæ*; at 11 h. 45 m. crossed a valley trending W.; at 1 h. 5 m. observed a range of high wooded hills to the E. and S., and

altered our course towards a remarkable gorge which bore N.  $129^{\circ}$  E.; at 3 h. 30 m. entered a gum forest; at 3 h. 50 m. struck a large stream-bed with many pools; following down this stream to the S., at 4 h. 40 m. bivouacked on its right bank. Lat. by observation  $30^{\circ} 42' 39''$ ; long. by account,  $116^{\circ} 0' 0''$ .

20th.—At 7 h. 30 m. A.M. crossed the river, which appeared to be a branch of the Moore River, and, steering N.  $160^{\circ}$  E. through a grassy gum forest, at 8 h. 0 m. came on an open scrubby hill, at the top of which we arrived at 8 h. 20 m. Here the country changed to a grassy forest. At 8 h. 55 m. ascended a rich grassy hill, the soil a brown loam, with fragments of trap and granite rocks in great abundance. This description of country continued till 12 h. 0 m. The hills were timbered with York-gum and jam-wattle. Many large stream-beds were crossed, all trending to the W. At 12 h. 15 m. the country became scrubby, the hills were ironstone, gravel, and sand, timbered with white gum; at 2 h. 20 m. entered a valley of better character, with quartz and granite rocks; after crossing several steep rocky ridges, at 3 h. 20 m. crossed the main branch of the Moore River, and bivouacked at 3 h. 25 m. This was the first place where we had observed the poisonous *Burtonia*. Lat. by observation,  $31^{\circ} 0' 39''$ ; long. by account,  $116^{\circ} 12' 45''$ .

21st.—Leaving our bivouac at 7 h. 40 m. A.M., followed up the stream N.  $130^{\circ}$  E.; at 8 h. 0 m. passed a deserted sheep station. Here the river made a sudden bend to the N., we therefore left it, and continued N.  $130^{\circ}$  E., over broken ironstone country, timbered with white-gum and grass trees. A few grassy hills were seen to the northward. At 10 h. 0 m. the country became more level and sandy; at 11 h. 45 m. came on the road from Bolgart Spring to Victoria Plains. Following the road S., at 11 h. 55 m. halted for an hour and a half at a small stream-bed trending to the N.E. We then continued our journey along the road, the general direction being S.E. by S. The country is level, and timbered with white and red gum. At 3 h. 35 m. crossed a small stream-bed, one of the heads of the Toodyay Brook. The country here improved. At 4 h. 5 m. bivouacked at a spring close to the road. Lat. by observation,  $31^{\circ} 14' 19''$ ; long. by account,  $116^{\circ} 34' 0''$ .

22nd.—This morning an hour's ride brought us to Bolgart Spring, after an absence of 47 days, during which we had travelled about 953 miles, traversing 3 degrees of latitude and nearly  $4\frac{1}{2}$  of longitude.

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V.—*Report by Lieut. Helpman, R.N., Commander of Colonial Schooner Champion, on an Expedition to examine Coal discovered on the Irwin River. 1846.*

[Read 13th Dec. 1847.]

HAVING received the horses and cart, together with the necessary supplies, on board, I left Fremantle at 5 A.M., December 4th, and, with a fine steady breeze from the S.E., kept well in sight of the coast as far as Jurien Bay, keeping up a chain of bearings. Numerous small islands and reefs front the coast about 4 or 5 miles off shore, from a few miles north of the Winding Sheet to this bay.

*December 6th.*—At 9 A.M. we anchored in Champion Bay, and immediately commenced landing the horses, cart, &c. We saw several native fires in the Chapman, and at 11 A.M. were met by 17 natives, who were particularly friendly, and showed us water at the back of the large white sand-patch. This was very fortunate, as we failed in getting any by digging. At 2 P.M. another party of natives joined, making 26 in number: they were remarkably fine men. Whilst we were at dinner, they succeeded in stealing three small tomahawks, and had got clear away with two before discovery; the third we found partly buried in the sand. When they first came down the horses astonished them very much, particularly when they came swimming on shore.

*7th.*—At 5 A.M., having all quite ready, we left, and keeping S.S.W.  $1\frac{1}{2}$  mile, came on the beach at Port Grey, which we followed to Point Grey, a small, low, rocky point. We turned E., and immediately came to the dry sandy bed of the Greenough. That this bay is the Port Grey I am confident, and its appearance fully bears out Captain Grey's opinion. It has an extensive reef running S. from Point Moore, and one to the N. from Point Grey, and a centre one leaving a clear opening on each side. Excepting from the high ridge of sandhill and the wide beach, I should have felt positive a good harbour was to be found here. The northern part offering a snug appearance, I was anxious to have it sounded.

The natives who had been with us yesterday followed to the Greenough, and on this occasion brought their women. They showed a small well of water, which was very indifferent. The water of the river lay back about 150 yards, and was quite salt. We kept on the left bank of the river, which for the first 3 miles was about 50 yards wide. From a high sand-hill we saw the river still trending to the S.E., and the coast-line was quite visible, having a small ledge about 6 miles off. At 4 h. 15 m. we halted at the bed of the river, where we found a native well, and, clearing it out 4 feet deep, we obtained good water.

8th.—Left the encampment at 6 h. 15 m. A.M., and followed the right bank over the same kind of country as yesterday till 7 h. 10 m., when we crossed the bed (being 20 feet deep and 50 feet wide). We came now upon a fine open piece of land, extending from one side of the plain to the other  $1\frac{1}{2}$  mile, the general course S.E. At 7 h. 15 m. we passed a break in the eastern hills, probably the main channel of the river, as after this the bed was scarcely discernible: at noon we were at the head of the valley. Shortly after entering the scrub we came to a very singular natural basin in the limestone rock; it was about 50 yards in diameter, and 20 feet deep. Mr. F. Gregory went to the top of the highest and nearest sand-hill, and saw that the only route was by turning to the N.E. by N., over low ridges of very scrubby limestone country. We were now close to Mt. Hill, and the country, so far as we could see, had much the appearance of that we were on. We had considerable difficulty in passing over 5 or 6 miles of this, and at 6 halted quite fatigued.

9th.—Keeping in a S.E. by S. direction over a wretched country, very thinly timbered, at 6 A.M. we came on the high land dipping to the S.E. towards the Irwin, descending which we came on a small flat, and at 6 h. 40 m. passed through a gum-forest; at 7 we passed along the side of a sandy ridge,—a few small flats well-grassed and numerous warren-holes were passed; at 8 h. 30 m. flights of white cockatoos and a well-defined line of trees clearly showed the river at no great distance. We here met with the first native hut; it was well *plastered* outside, about 6 feet high inside, and capable of containing 10 persons easily. At 9 h. 40 m. we came to the Irwin, and found water in small pools. The banks were about 30 feet high, and the river 80 yards wide, although in ordinary winters I do not think the water runs over the whole of it; the banks were limestone and clay; the bed coarse sand, with trees growing in it; the lat.  $29^{\circ} 13' 50''$ .

11th.—At 6 h. 15 m. left in an E.N.E. direction, and in 10 min. crossed the flat, and ascended the high sand and scrub-hills, along which we continued at an average distance of  $\frac{3}{4}$  of a mile from the river, till 8, when we turned E., and at 8 h. 40 m. came on extensive warren-grounds on the edge of a fine wide grassy flat, through which the river runs; this we followed till noon, when we halted for a short time at a well, in which we found good water 2 feet 6 inches below the surface.

We remained here till 3 h. 35 m.; and, as we were anxious to know how far we could be certain of water, Mr. Gregory and myself kept near the river while the cart made for a very remarkable piece of land, which had much the appearance of an island. The valley of the river was very small; the higher route in which the cart kept was ironstone and scrub. We found plenty of water

in pools under the cliffs at this point, which we reached at 5, when we encamped at a very pretty spot, the valley narrowing in until the hills nearly met. We were here received by a party of natives, who came without any hesitation to welcome us. They were not in the least surprised or so curious as the others had been, and were much inferior in appearance to our friends at Champion Bay. As some of our men were suffering from sore feet, the cart not in very good condition, and water not at all to be relied on, I was obliged to divide the party. The natives encamped on the opposite side, and were very quiet. Latitude  $29^{\circ} 9'$ .

12th.—Leaving six of the party with all the spare provisions, lightened the cart, and enabled us to push along much faster; we kept about N.E. near the river, over a scrubby, hilly country, till 8 h. 30 m., when we passed a range of wooded hills running from the S., which came close down to the river. At 8 h. 40 m. we came to a pool of fresh water; a native well was found close to the edge of this, out of which some pieces of shale had apparently been thrown; but, as none could be found elsewhere, I presume these must have been washed down. At 9 h. 50 m. we passed another pool: the river had here worked a deep channel through clay and red sandstone.

All the ranges were flat-topped, with very abrupt terminations, giving a singular appearance to the country. We were now crossing a belt of tolerably good grassy country, extending for a few miles in a S. direction, most probably to the South Irwin. We continued on a course for the end of a high range, passing over during the latter part a very poor piece of land covered with trap, granite, and quartz. At 12 h. 45 m. we ascended the first table-land, consisting of sandstone and ironstone. This range extended S.S.E. for many miles, and had a dark line of red sandstone running along it about 12 feet from the top. On reaching the summit we found it very scrubby, and difficult to pass with the cart. Several deep gullies ran into the high land, one of which we crossed, but headed the others. This occupied a long time, and it was near 3 before we came to the deep gully in which the coal was, and in which the river runs. The ranges are composed of red and white sandstone; the few trees in the valley were stunted, principally of white gum and wattle. At 5 we went down to the coal. The valley, about three-fourths of a mile wide, was well-grassed, and we found plenty of good water by digging a few inches. The river is here about 25 yards wide, running through sandstone and shale of different kinds. Salt water was lying on the coal in small quantities. The coal-fire made by Messrs. Gregory had left nothing but very fine ashes and no cinders. The latitude of the bivouac, which was on the edge of the table-land, half a mile S.S.E. from the coal, was  $28^{\circ} 57' 42''$ .

13th.—We were not long in digging out about 3 cwt. of coal from about 4 feet deep; the seam was nearly 6 feet thick, and ran entirely across the bed of the river and under the bank on both sides. At the well, which was a quarter of a mile higher up, very good shale was dug.

At 11 we were ready to return, having 3 cwt. of coal in the cart. We shortened our route over the table-land by avoiding the gullies, and found it a very easy road; the thick brushwood made walking rather uncomfortable, but it was easy for the cart. Descending these ridges, we kept nearer the river than in going, and found much better travelling. The upper pool was reached at 2 h. 30 m., and at 5 we again moved on, passing close to the river over well-grassed flats, till we came to the depôt hill, which we reached at 8, and found the party quite well, but they had been dreadfully tormented with flies. The natives paid them but one visit, and had all decamped in the morning. The cart, unfortunately, was capsized just before it came in, and was much injured. It was not in good order before; but this shake rendered it doubtful if we could take it back, more particularly weighted as it now was.

14th.—The flats we passed were all well grassed, and the travelling very easy; at 11 h. 15 m. we halted at the marked tree, the water in the well still plentiful. The heavy dews and sharp cold nights had given us all colds. We remained here to rest the horses; they were looking a good deal knocked up.

15th.—At 5 h. 30 m. we started for the pool, passing close to a high piece of table-land over a very scrubby country. Two kangaroos rewarded our sportsmen for their early labour; they were the only ones killed; we had seen but few, not a dozen in all. At 11 h. 15 m. we reached a pool about one mile lower down than the one we had previously stopped at. We crossed a small gully close to this, on the upper part of which Mr. Gregory saw a spring in his last trip. The flats here are about a quarter of a mile wide, of a good light soil, and well grassed.

16th.—At 3 h. 30 m. commenced packing, and at 6 h. 10 m. started; a few natives followed us; ten minutes' walking took us to the scrubby limestone hills. Preserving a course about  $329^{\circ}$  we gradually ascended and kept on the high ground. I was desirous to pass the valley where we supposed the Greenough ran to the eastward. At 10 h. 45 m. we crossed a small watercourse trending to the westward, Mount Hill  $335^{\circ}$ . At noon we changed the course to  $303^{\circ}$ , and at 1 stopped for dinner in a small flat well grassed and extending to the S.W.; clumps of wattle acacia were frequent. At 2 h. 15 m. started on a N.W. course, at 3 h. 5 m. ascended a small sand hill and saw into a valley about a quarter of a mile wide, extending N.N.W. In a small open

piece of ground surrounded by clumps of wattle, we found several wells of considerable size, about 8 feet deep. We halted here for the night.

17th.—At 6 we were once more under weigh, and at about 8, after passing over a very mixed country, but generally scrubby, came into a large valley extending to the N.W.; this was very similar to the one through which we walked on our way up the first day, though not so extensive; we were not long, however, before thick brushwood compelled us to get on the high land, a short distance only from the valley we were endeavouring to look into. The higher land was very scrubby and of limestone. We shortly came to the Greenough running in a westerly direction, and most probably from Wizard Peak; it was quite dry. Passing this, we came upon the level country of the first day, and at 3h. 30m. halted at the limestone well, where we remained for the night.

18th.—Left at 6 h. 15 m., and following the old route, reached the beach in Champion Bay about noon. The vessel had experienced very heavy S. and S.S.W. winds, the barometer constantly low, but fine bright weather. From the summit over Point Grey, we had a clear view of Port Grey; the southern part does not offer the least protection for vessels, a heavy surf rolling in, but the appearance of the northern part was very favourable.

The cart was now in too dilapidated a condition to be taken round Moresby's flat-topped range, and as the three horses would move over the ground fast, and enable the country S. of the Hutt to be examined, I considered it best to let two of the Messrs. Gregory and Lieutenant Irby, who volunteered, accomplish that part of my instructions, whilst Mr. J. Gregory and myself examined Port Grey.

20th.—At 8 the party started, and the forenoon was occupied in taking the cart and things off, and getting the boat ready for Port Grey: it however continued to blow a gale of wind from the southward until the 22nd, when I passed round Point Moore, and into Port Grey. There is plenty of room for boats between the reefs and the point. We found the part between the long reefs from Point Moore and the reef running off from the land foul, and although there was not much wind, it was breaking in 5 fathoms. This I account for by the fact that the reefs are not level with the water, and the outer side of them having 14 fathoms close to them in a very heavy swell.

A very snug little harbour is formed by the reef extending from the land in the depths of the bay. It was quite smooth, the reef was dry, and we had plenty of water close to it (2½ fathoms). The point of this natural jetty shuts in with Point Grey, bearing S. by E., so that no wind could hurt. I consider this little place

admirably adapted for small coasters; the fresh water is close to it, and an anchor could easily be landed on the jetty, to which they would secure. The passages between the outer reefs are quite clear. The return of very strong breezes compelled us to get into Champion Bay, for, after we left the small bay, the sea ran so high that it required one man constantly to bale the boat.

At 1 the three horses were seen near the Chapman, and by 2 the exploring party were down. Messrs. Gregory's report was highly favourable: they passed over an excellent country, as shown by the subjoined journal.

20th.—At 6 h. 30 m. started from Champion Bay, following the beach till 6 h. 35 m., when we turned N.  $87^{\circ}$  E. over a scrubby country; at 7 crossed the Chapman, at 8 Mount Fairfax bearing S.  $\frac{1}{4}$  mile; turned N.  $66^{\circ}$  E., the country very thinly dotted with wattle, scrub, and some grass. At 8 h. 30 m. crossed a large branch of the Chapman with several small pools of water, the banks high and steep; the country then became more scrubby, with gravelly soil; at 9 altered our course to N.  $18^{\circ}$  E. and at 9 h. 30 m. crossed the Chapman, below a small pool of water apparently permanent; 9 h. 50 m. passed over a granite ridge, when the country improved and several fine patches were seen to the eastward; at 10 h. 20 m. ascended a high flat-topped hill of red sandstone resting upon granite, which proved to be the eastern part of Moresby's flat-topped range; from this summit Mount Fairfax and Wizard Peak were visible. To the eastward the hills were apparently grassy and gradually rose from the Chapman for 8 or 10 miles; at 11 came on a large party of natives, some of whom accompanied us for one mile, pointing out several places where we could obtain water; at 11 h. 10 m. turned N.E. and entered an extensive valley with patches of grass, but not of a good quality; at 30 m. crossed a watercourse trending to the westward; following it for half a mile, we turned N.W. over a scrubby flat till 1 h. 5 m., when we struck the bed of a small stream, with several small pools of water in it. Halted for dinner, then renewed our route up the stream to the northward; at 3 it turned to the east, we therefore halted for the night by a small pool with good feed on the banks.

21st.—At 6 h. 35 m. continued our route N. over a hilly country of scrub and grass, with York gums and wattle; the prevailing rocks were quartz, red sandstone, and granite; at 8 h. 30 m. crossed the bed of a stream 8 yards wide with brackish pools; at 8 h. 50 m. came upon a good grassy country, which appeared to extend 8 or 10 miles E. and N. Clumps of York gums, sandalwood, jam, and black wattle were observed on some of the hills; crossed several inconsiderable watercourses, some trending E. and others W., till 9 h. 45 m., when we ascended an elevated

sandy table-land covered with short scrub; at 10h. 35m., not seeing any immediate improvement to the northward, changed the course to the west; following a deep gully, we struck a small stream trending S.S.W. with numerous small pools of brackish and salt water, traced it down till 11 h. 25 m., when we found a small hole scratched in the bed between two salt pools; the water in the hole was perfectly fresh. Halted till 12 h. 53 m. when we resumed a westerly course, crossing several deep grassy valleys running to the S. At 1 h. 35 m. turned  $211^{\circ}$  over a hilly quartz and granite country, with very good grass in the valleys and on the tops of the hills; at 2 h. 30 m. again struck the stream bed, the country improving, being covered with grass and thinly scattered jam and black wattle as far as the eye could reach. At 3h. 50 m. this stream being joined by another from the eastward, turned N.N.W.; following its course, at 4 h. 30 m. passed a brackish pool, and at 5 bivouacked in the bed of the stream, obtaining water by digging a few inches in the sand.

22nd.—At 6 left our bivouac and steered  $210^{\circ}$  over a fine grassy country; at 7 ascended a small ironstone hill, from which we observed a deep valley trending S.W. In the N. and W. the grassy country extended for at least 10 or 12 miles, presenting to our view 50,000 or 60,000 acres of sheep pasture of a fine description; continued a S.W. course over a granite country with some good patches of grass, but not equal to that passed yesterday; at 8 crossed a small stream bed, which we considered to be the Bowes of Captain Grey; we then ascended the steep limestone hills on the western bank of the stream, from which we observed the large sandpatch on Point Moore bearing  $170^{\circ}$ ; turning south we crossed the mouth of the Bowes, quite dry, then altered to S.E., with the intention of tracing Captain Grey's route towards Champion Bay; after traversing sandy downs resting on limestone, about 4 miles, came on a deep ravine in the limestone hills: one of the horses being footsore we were obliged to return to the beach, which we followed to Champion Bay, where we arrived at 1, passing the mouths of the Buller and Chapman, and another small stream.

23rd.—Employed getting the horses on board, before the northerly wind got too fresh; they looked a good deal fatigued; by 9 we were under weigh, and with strong headwinds did not reach this until 27th.

With regard to the practicability of getting the coal down, I think there can be no doubt it could be done; the road by which we returned offered no difficulties but such as would easily be surmounted; the chief one would be the gullies, running out from the table-land near which it lay, but this would be very easily done, by a road being cut at the foot; that there is plenty

of coal there can be no doubt, and the river running over what we saw would not be a difficulty, as the shaft could be sunk on either bank.

I have several reasons for supposing Champion Bay safe during winter, although open to the northward and westward; the first is the low sand beach, then the vegetation growing close to the high water mark, say 20 yards, whilst all the beach to the southward of Point Moore was blown into high ridges, and was generally about 30 or 40 yards wide: from all I observed I should say that if northerly gales reach there, they must be very much more moderate; but in Port Grey there was evident proof of the effect of southerly winds.

The small snug harbour in Port Grey is quite sheltered, and admirably fitted for small vessels loading or unloading.

There was a great want of timber over the whole country; but I do not think there is any doubt that water could be obtained anywhere.

*Fremantle, 31 Dec. 1846.*

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VI.—*Memorandum respecting an old Globe (supposed date about 1520) in the Public Library of Frankfort-on-Maine; brought there from a Monastery about sixty years ago. By Mr. H. BLANCHARD.*

DATE of discoveries (America).

*America.*—Columbus (born 1435) left Palos on the 3rd of August, 1492; by the 7th of October he had sailed 750 leagues to the westward of the Canaries, and expected to find the island of Cipangi (Japan). He discovered land that evening, viz., St. Salvador, one of the Bahamas; he arrived at Cuba on the 28th of October, still believing himself to be in Asia; and, coasting the N. side of Hispaniola, returned to Spain.

On the 25th of September, 1493, he sailed on his second voyage from Cadiz; made Dominica and Guadaloupe, surveyed Hispaniola, Jamaica, and Cuba, and returned.

On the 20th of May, 1498, he sailed from St. Lucar on his third voyage; made Trinidad and the main land adjacent, thence bearing up for Hispaniola, he returned to Spain under arrest. During this voyage Ojeda sailed from Spain (having Amerigo Vespucci on board his ship) on a voyage in which he coasted from Trinidad to near Darien.

On the 9th of May, 1502, Columbus sailed on his fourth voyage from Cadiz, his attention being wholly directed to discover the strait which he supposed to exist between N. and S. America. He

reached St. Domingo; thence sailed to the Bay of Honduras, near Truxillo. On his passage down he met a large canoe, which urged him to proceed westward, where he would find a rich and cultivated country (Yucatan and Mexico), he coasted the Musquito shore from Truxillo to the Bay of Panama near Darien, thence he returned to Cuba; and to St. Lucar in Spain, on the 7th of November, 1504; believing he had been very near the mouth of the Ganges. He died the 20th of May, 1506, believing to the last that he had discovered the regions of the East, and that Cuba and Terra firma were the eastern parts of Asia.

Vincente Pinzon sailed early in December, 1499, from Palos. Passing the Cape de Verdes, he steered S.W., and in 8° S. lat. made Cape St. Augustine, Brazil; thence coasting N., he discovered the mouths of the Amazon and Orinoco, and, passing the Boca del Drago, proceeded to Hispaniola, and thence returned to Spain, arriving in September, 1500.

In 1506, and again in 1508, Vincente Pinzon undertook expeditions to find the strait or passage supposed by Columbus to lead from the Atlantic to a southern ocean; no such passage, however, exists.

Ojeda sailed on a second voyage in 1502, and explored the Gulf of Paria to the Bahia Honda. He sailed again in 1509 with a commission to found colonies between Paria and Darien (*on this expedition Pizarro accompanied him*). The following year Nunez de Balboa followed him, and succeeded to his command; and, hearing a report of the South Sea, led a party (*including Pizarro*) across the isthmus, and discovered it the 26th of September, 1513. He embarked on it, visited the Pearl Islands in the Bay of Panama; and, receiving information that the coast extended far to the N., and that there was a large and civilized nation to the S., he returned to Darien.

Subsequently (about 1518) Pedrarias built Panama on the South Sea, and in November, 1524, Pizarro embarked on his expedition for Peru.

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The recent researches of the Danish Antiquarian Society have shown that the Northmen of the tenth and eleventh centuries visited Greenland, Newfoundland, and probably as far as Nantucket; in the thirteenth century they appear to have reached further S., but no evidence appears of these voyages being known to Columbus.

John Cabot sailed on a voyage of discovery from Bristol (during Columbus's second voyage) in 1494, and returned on seeing Newfoundland. He obtained a patent from Henry VII., under which his son, Sebastian, sailed in May, 1497, in search of a N.W. passage to India. He reached 67° N., finding the sea

quite open; but his men mutinying, he bore to the S. till he came to  $38^{\circ}$  N. on the coast, which he expressly says was afterwards called Florida, having seen the *continent* of America, which Columbus only visited the following year.

In 1512 Don Juan Ponce de Leon took possession of Florida, and so named it on behalf of the King of Spain.

Sebastian Cabot subsequently entered the service of the King of Spain, in which he discovered the River Plata, and sailed up it 360 miles; on this he was made Grand Master of Spain, but he afterwards returned to the English service.

Cabral sailing from Portugal for the East Indies in 1500, stood so far to the westward that he fell in with land, which proved to be the Brazils. They coasted it S. to Porto Seguro in  $15^{\circ}$  S. lat.

Magellan sailed from Seville on the 10th of August, 1519, declaring his belief that there must be a passage to the S. similar to what he believed Sebastian Cabot had found to the N.; he wintered in  $49^{\circ}$  S., and first observed the Patagonians. He entered the South Sea on the 28th of November, 1520; then sailing three months and twenty days in a N.E. direction, he arrived at the Ladrones on the 10th of March, 1521. Here he was killed, and his ship arrived at San Lucar the 7th September, 1522.

Hernandez de Cordova sailed from Havannah on discovery the 8th of February, 1517; and, passing Cape Catoche, proceeded along the W. coast of Yucatan to Campeachy and Potanchan, but losing many of his men by an attack of the natives, he returned to Cuba.

John Grijalva sailed from Cuba on the 8th of May, 1518; following the same course, he coasted the Bay of Campeachy and Mexico to San Juan d'Ulloa, and returned to Cuba.

Hernando Cortes sailed from Havannah on the 10th of February, 1519; and, making conquests along the coast, founded Villa Rica de Vera Cruz, and sent his first tribute and dispatch to Spain on the 16th of July, 1519.

*Remarks.*—The annexed memoranda of the discoveries made during the thirty years immediately following the discovery of America by Columbus, together with the few appended remarks on the different voyages and travels which had indirectly brought information of the existence of distant countries, will probably be the best means of forming an opinion of the date of the globe alluded to.

At the period it was made, information frequently travelled slowly, but considerable research must have been used to form it. In assuming the date of 1520 as about the period, that year embraces the knowledge of all that Columbus ever attained—of the discovery of the South Sea by Nunez de Balboa—of the River

Plata by Sebastian Cabot—and of the discovery by Cordova of Cape Catoche and Campeachy in 1517; but not of the discoveries of Magellan, who sailed in 1519 and returned in 1522; nor of Cortes, who discovered Mexico in 1519; nor of Pizarro, who left the infant colony of Panama on his expedition for Peru in 1524.

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VII.—*Observations upon M. d'Abbadie's Account of his Discovery of the Sources of the White Nile, and upon certain Objections and Statements in relation thereto, by Dr. Beke.* By FREDERICK AYRTON, Esq., F.R.G.S., and Member of the Geographical Society of Paris. Abridged.

[Read January 24th and February 14th.]

“CAPUT Nili quærere” has so long been accepted as a phrase significant of the futility of attempts to discover the sources of the famous river of Egypt, that, perhaps, one ought not to be surprised that a sudden announcement of success, even though professing to be founded upon the positive testimony of personal observation, should be met by incredulousness. Nor is it astonishing that ancient hypothesis, resting on conjecture (which, if experience had failed to confirm, it had equally failed to contradict), should still find an advocate unwilling, on the first summons, to surrender its easily enjoyed speculative conclusions to the stubborn dominion of facts; although these facts are broad and plain, and supported in their credibility by the ready manner in which they range by the side of collateral data, and reconcile the jarring opinions which have prevailed upon this key-stone of African geography from the time of Ptolemy Claudius, who first essayed to fix it definitively, to that of M. d'Abbadie's having announced his final discovery of its true position. But the question, as is well known, had an interest long anterior to the time of Ptolemy the geographer: Sesostris, Cambyzes, Alexander, Ptolemy Philadelphus, Cæsar, Nero, and not a few besides, who have sought to leave for the chaplet of their future fame a record of their discovery of the sources of the Nile, have failed in attaining this object of their ambition. For thirty centuries had men set themselves in vain to solve this great geographical problem; and what neither the authority of kings nor the researches of philosophers could previously effect, two private travellers, aided by no influence, by nought save their own personal means, intelligence, patience, perseverance, untiring energy and enterprise, have at last accomplished.

Such were my impressions upon first learning the great dis-

covery made, after nine long years of toil, danger, and privation for its purpose, by the MM. d'Abbadie.

It will be recollected that some fifty individuals have, within the last ten years, appeared as rivals in the field for the same ultimate purpose of discovery with the MM. d'Abbadie. But all, save the MM. d'Abbadie, have failed in the enterprise. From various causes their competitors have found themselves stopped at the first Nile, unable to push their researches beyond it, into the very regions where alone they could hope to profit by personal observation of the circumstances they wished to elucidate. Nor have the MM. d'Abbadie, as suggested, to thank the kindred sympathy of European nations, and their scientific bodies, for the influence which has enabled them to traverse in safety regions which have scared from their face other travellers, who were doomed to stay their course at the hither boundary of the ground where the palm of victory was to be contested. England sent her mission—France her emissaries—both alike returned disappointed. The veil of Isis was not to be removed at the bidding of suitors, who, foregoing their own account, pleaded for nations, which, once foremost in contention to despoil her fane, now only sought to make her presence the subject of their renewed rivalry, and not till she was approached by an admirer whose devotion to her cause for nine years bespoke the truth of his passion, did she deign to unfold the mystery of her tears.

To pass from metaphor to reality—what is the substance of the discoveries announced by the MM. d'Abbadie, and how have they compassed those discoveries, that their announcement of each step of their progress should have been made the subject of suspicious scrutiny, and a cause for attributing to them, in the outset of their undertaking, motives wholly foreign to its ostensible purpose? In reference to these questions, I propose to examine the nature of the MM. d'Abbadie's discoveries, the objections which have been urged to those discoveries, and the evidence by which they are supported.

To consider, then, the sufficiency of M. d'Abbadie's opinion, as contested by Dr. Beke, of his having discovered the true source of the Nile—the Nilus of the ancients, the Bahr el Abyadh of the Arabs, and the White Nile of European writers,—I conceive the case between M. d'Abbadie and Dr. Beke to stand thus:—

M. d'Abbadie concludes from his researches, while he was at Saka, into the geography of Inarya and the circumjacent districts, that the main stream of the White Nile is formed by the union of the several primary and confluent rivers which he has enumerated (*Bulletin de la Société Géographique, January 1845; Athenæum, Nos. 906 and 1041*) as having their sources in the irregular basin

formed within the mountains of Inarya, which, on the N. and E., separate the waters of this basin from those which fall into the Blue Nile and Hawash, or run towards the Gulf of Aden, and, on the S. and E., from those which, dissemboguing on the E. coast of Africa, fall into the Indian Ocean.

A part of this mountainous tract to the S.W. of Saka, M. d'Abbadie alleges to be called Gamaro or Gimiro, whence he derives the Arabic appellation for the same mountains, of Gebel el Qamar, el Qomr, or Qomri, signifying, in either form of the last word, "Mountains of the Moon."

He then urges that, as the question of which of the confluent rivers shall be held to constitute the first course of the White Nile, has never been determined by general local consent, he is entitled, in tracing upwards the course of the White Nile, amid its successive confluent streams, to select between any two or more of them, when they meet, that one, for the main stream of the White Nile, which contributes, to the immediately confluent stream, the largest volume of water, and most nearly coincides with it in direction; and, proceeding upon this principle, he states, from personal observation and the most careful inquiry, extending even to the deputing two men specially to visit the rivers Gibe of Leqa and Gibe of Inarya, near their confluence, in order to ascertain their relative magnitudes, that the Gibe of Inarya, which flows to the N. of the Gojeb of the same province, is to be taken as concurrent with the upper course of the White Nile; and that, again, the Bora, which is the principal tributary of the Inarya Gibe, is the actual commencement of the White Nile; and that, consequently, the source of the Bora, which M. d'Abbadie, from astronomical observations made by him at Saka, computes to be in  $7^{\circ} 49' 48''$  N. latitude and in  $36^{\circ} 2' 39''$  ( $34^{\circ} 42' 24''$  E. of Paris) longitude E. of Greenwich, is the source of the White Nile.

As directly opposed to the preceding views of M. d'Abbadie, Dr. Beke contends, upon the authority of oral information afforded to M. d'Arnaud, who, in charge of an expedition sent in 1842 by Mahommed Ali, Viceroy of Egypt, for the purpose of exploring the White Nile, ascended its stream to a point in  $4^{\circ} 42' 42''$  N. and  $31^{\circ} 38\frac{1}{4}'$  E. ( $29^{\circ} 18'$  E. of Paris), that the direct stream of the White Nile continued to ascend for one month's journey from that point in a southerly direction, that the true source of the White Nile is to be sought for in the country of Mono Moezi, which, according to Dr. Beke's deductions, based upon certain observations by Mr. Cooley in his 'Essays upon the Geography of the N'yassi,' published in the 15th and 16th vols. of the Journal of the Royal Geographical Society, lies to the S. of the 2nd degree of S latitude, and between the 29th and 34th degrees of E. longitude.

The Gibe and Gojeb of M. d'Abbadie, and the Shooa-berri of M. d'Arnaud (receiving into their streams the whole of the rivers from Inarya and Kaffa, which flow to the White Nile), are by Dr. Beke assumed to be, the two first, after their confluence in their lower course, identical with the Saubat of M. d'Arnaud, which joins the White Nile on its eastern bank in latitude  $9^{\circ} 11' N.$  and longitude  $30^{\circ} 34' E.$ , and the last a tributary joining the White Nile, yet extending much further S.

Dr. Beke has referred (Athen., No. 1044) to his 'Essay on the Geography of the Nile,' published in the 17th volume of the Journal of the Royal Geographical Society, in which (p. 70), in the course of explaining the errors into which the Portuguese and Spanish writers of the 16th and 17th centuries fell in their attempted identification of the easternmost of the rivers which fall into the Blue Nile, or Nile of Abessinia, with the Nilus of Ptolemy, the conclusion is involved, that the lake of Zambezi (of the Portuguese), situate in the country of Mono Moezi, is the easternmost of the two lakes, which, according to Ptolemy, lie respectively in the course of two rivers that subsequently unite to form the Nilus. The source of these two rivers is said by Ptolemy (lib. iv. c. 9) to be in the Mountains of the Moon; and as the word "moezi," according to Dr. Beke, signifies, in a large class of the languages of Africa, "moon," he infers that the same word supplied a derivation for the Mountains of the Moon of Ptolemy.

Dr. Beke likewise advances against M. d'Abbadie, that upon his first visit to Inarya, in 1844, he asserted that the Gojeb, and not the Gibe, was to be regarded as the origin of the White Nile, and as he does not allow M. d'Abbadie any credit for a sufficient cause for having changed his opinion in favour of the Gibe upon his second visit in 1846, he would appear to suggest that the discrepancy should militate against the sufficiency of M. d'Abbadie's conclusions on both occasions.

Now it will readily be seen that the material issue between Dr. Beke and M. d'Abbadie is not whether this or that river in Inarya, or elsewhere, is to be regarded as the source of the White Nile, but whether the system of waters of the Nile is actually confined to Abessinia; Inarya with the immediately circumjacent districts, which have been assumed by M. d'Abbadie to supply the whole drainage for the upper course of the White Nile; and a tract, comparatively unimportant in respect of the volume of waters supplied by it, to the W. of its course, northward of the point reached by M. d'Arnaud; or whether we are to assign to the Nile a far more extensive system of drainage, and extend its waters into a country to the S. of the 2nd degree of S. latitude.

According to M. d'Abbadie's views, the two Niles S. of their confluence at Khartoum (in  $15^{\circ} 37' 10' N.$ ) have a relation to

each other very analogous to that subsisting between the Euphrates and the Tigris. In both cases similar formations of mountains and incidents of climate may be supposed to produce on the opposite sides of a culminating ridge two systems of river drainage, of which the rivers of the outer system, that is, the White Nile and the Euphrates, collecting their waters from the larger extent of country lying on the outer side of the curve, and exposed to the earlier effects of the general winds which bring rain, or its equivalent snow, will be larger than the inner rivers, that is, the Blue Nile and the Tigris, which derive their drainage from the lesser space of ground on the inner side of the curve and to the leeward of the culminating ridge.

Dr. Beke's views in the case of the Niles do not admit of this comparison, inasmuch as, by carrying the main stream of the White Nile to an origin far S., and remote from the same mountainous region which on its northern or inner declination transmits its waters to the Blue Nile, the opposite or outer declination of this region is made but of secondary importance to the system of waters of the White Nile; and he must suppose that there is an uninterrupted connection by ascending valleys, through which the main stream of the western or White Nile extends, to a part of Africa to the S. of the 2nd degree of S. latitude, and between the 29th and 34th degrees of E. longitude; whence it would follow that, instead of the mountains of Inarya and Kaffa, in from  $10^{\circ}$  to  $5^{\circ}$  of N. latitude, and from  $35^{\circ}$  to  $40^{\circ}$  of E. longitude, constituting the point of culmination of the eastern part of Africa, we are to look for the culminating point of this part of the continent in from  $29^{\circ}$  to  $34^{\circ}$  of E. longitude, and to the S. of the 2nd degree of S. latitude.

On the right solution of this question will necessarily depend, to a considerable extent, the correctness of our ideas of the physical geography of Africa. In the absence of primary data it is, of course, impossible to do more than recur to those of a secondary order for its elucidation; and as the conclusions to be deduced in this state of our information will involve general rather than minute topographical facts, I propose, without going into local detail (a knowledge of which may be readily acquired by consulting the valuable papers by Dr. Beke and M. d'Abbadie already alluded to), to notice a few leading circumstances, which, so far as they bear upon the general grounds on which I have ventured to put the question, seem to me to direct opinion in favour of M. d'Abbadie; and I do this not without some hesitation, since I fully accord to Dr. Beke's opinions upon the geography of the Nile, the consideration and importance to which his indefatigable researches, physical as well as mental, into that subject, so well entitle them: but then I must not forget that

M. d'Abbadie's conclusions are the fruit of nine years' investigation on the spot, aided by great qualifications for his purpose.

To take the objections by Dr. Beke in the reverse order in which I have cited them, I may first observe, that the discrepancy between M. d'Abbadie's first assumption of the Gojeb being the source of the Nile, and his subsequent conclusion that the Gibe of Inarya is to be regarded as its true source, is, when viewed in its relation to the larger question of the geography of the basin of the Upper Nile, wholly unimportant. The source of the principal affluent of the Gibe is, as now computed by M. d'Abbadie, not more than 30 miles N., and as many E., of the source of the Gojeb, according to his computation of the position of that source in 1844: it is therefore a mere question as to which of two contiguous valleys may supply the larger affluent to their lower united stream, and if either one or the other supplies the source of the White Nile, the discovery of them both must be held to include the discovery of the source of the White Nile.

In objecting to M. d'Abbadie's derivation of *Gebel el Qamar*, or *Qomr* from the name. *Gamaro* or *Gimiro*, of the country, I cannot think that Dr. Beke has in any degree weakened M. d'Abbadie's hypothesis, by advancing that the derivation to Ptolemy and the Arabian geographers of the name of the mountains whence the Nile has its source, is to be sought for in the word "*Moezi*," because that word is alleged to signify Moon in some of the languages of Africa, and there happens to be a country of that name, to the south of the line, more nearly corresponding than *Gamaro* with the position assigned by Ptolemy to his *Σελήνης Όρος*.

The positions in *Æthiopia* recorded by Ptolemy cannot thus be made use of singly and independently of each other, when endeavouring to show the applicability of a particular position of Ptolemy to some particular place. The errors in his latitudes and longitudes are too great to admit of that simple method of using his authority. Thus the latitudes and longitudes, as given by Ptolemy (lib. iv. c. 8, 9), of the junction of the Nilus and *Astaboras* (White and Blue Nile), of the *Coloë Palus* (*Dembea Lake*), and of the *Lunæ Montes*, are, reckoning the longitudes from the meridian of the island of *Ferro*—

|  |                        |
|--|------------------------|
| Junction of Nilus and <i>Astaboras</i> | 12° N., 61° E.         |
| <i>Coloë Palus</i>                     | 0 69 E.                |
| <i>Lunæ Montes</i>                     | 12½° S., 57° to 67° E. |

The true latitudes and longitudes of the junction of the rivers, and of the lake, reckoning the longitudes from the same meridian, are—

|  |                         |
|--|-------------------------|
| Junction of Nilus and <i>Astaboras</i> | 15° 37' N., 50° 47½' E. |
| <i>Coloë Palus</i>                     | 12 0 N. 55 30 E.        |

So that Ptolemy placed the junction of the two rivers  $3\frac{1}{2}^{\circ}$  too far south, and  $13^{\circ}$  too far east.

Even were we to make the corrections in Ptolemy's latitudes and longitudes due to his having taken a degree of a great circle of the earth at 500 instead of 600 stadia,\* we should still fail to reconcile many of his positions with truth, or relieve them of the errors springing, as Dean Vincent observes, from his vague method of calculating distances, by the estimate of travellers and merchants, and the number of days employed in their journeys by land or voyages by sea. In some instances of places which may be supposed to have been more familiarly known than others to Ptolemy, a retrenchment, in the proportion of 600 to 500, will eliminate much of the error of longitude; as in the case of Alexandria, where a deduction of one-sixth from Ptolemy's longitude of  $60\frac{1}{2}^{\circ}$  would leave  $50\frac{1}{2}^{\circ}$ , which is only about  $2\frac{1}{2}^{\circ}$  too far to the E. of Ferro. But his latitudes are in many cases more irreconcilable than his longitudes. Alexandria and Syene are placed by Ptolemy in  $31^{\circ}$  N. and  $23^{\circ} 50'$  N., only a few miles to the S. of their true positions of  $31^{\circ} 11'$  N. and  $24^{\circ} 8'$  N., which shows that the latitudes of those two places were probably determined from observed altitudes of the pole, without reliance upon the estimated distance between them. Below Syene, however, towards the interior, where estimated distance must have been resorted to, the errors gradually increase, until the Colœe Palus (Dembea Lake) is made to be  $24^{\circ}$ , instead of  $12^{\circ}$ , to the S. of that place; and proceeding in the same way, why may not Ptolemy have placed the Lunæ Montes  $16^{\circ}$  or  $17^{\circ}$  too far S.? That quantity, applied as a correction to his latitude, would make it very well agree with the position of the Gamaro mountains about the sources of the Gojeb and Gibe; since if, to M. d'Abbadie's longitude of  $36^{\circ} 2' 39''$  E. for the source of the latter river, we add  $18^{\circ} 9' 45''$ , the longitude of the island of Ferro W. of Greenwich, we have  $54^{\circ} 12\frac{1}{2}'$  nearly, which falls sufficiently between  $47\frac{1}{2}^{\circ}$  and  $56^{\circ} 50'$ , the longitudes of the western and eastern limits of the Lunæ Montes (after deducting one-sixth from  $57'$  and  $67'$ , the number of degrees assigned by Ptolemy to their limits, as stated above) to warrant us, when taken in conjunction with the correction which may be applied to his latitude, in deciding, so far as Ptolemy's position affords an indication rather in favour of the identity of the Lunæ Montes with the mountains of Inarya, than with any which may exist in the country of Mono Moezi.

To return to the derivation of Gebel el Qamar: it has been upon another occasion observed by Dr. Beke, that if M. d'Abbadie's derivation were correct, how could Ptolemy have derived the

\* M. de la Rochette on the first Meridian of Ptolemy, in Dean Vincent's *Commerce and Navigation of the Ancients*, vol. i. p. 567; also vol. ii. p. 612.

sense of "mountains of the moon" from the word Gamaro? This objection must imply that the Arabian geographers translated their appellation of Gebel el Qamar from the Greek; otherwise it would be a sufficient answer to allege, that there is nothing to raise even a suggestion that Ptolemy derived his sense of Moon in the name of these mountains from the word "Moezi." It cannot be categorically proved that the Arabians did not, in this as in other instances, translate from the Greeks; but various considerations may be adduced which seem to render more probable that the Greeks were indebted to the early Arabs for their geographical nomenclature of the north-eastern part of Africa, than that the nomenclature of that region transmitted to us by the Greeks was first discovered and made known to the rest of mankind by themselves.

These considerations are founded upon the fact of the Arabs having been the earliest navigators of the Red Sea and Indian Ocean—upon the extent of the intercourse which history suggests as having existed in early times between Arabia and Æthiopia—the application consequent to that intercourse of the language of the Arabs in Abessinia—the circumstances under which, upon the accession of the Ptolemies to Egypt, the immediate trade between that country and the Red Sea was acquired from the Arabs by the Greeks, and afterwards continued by them under the Roman domination of Egypt—and lastly, the channels incidental to that commerce, through which the Alexandrian geographers may be supposed to have derived their knowledge of north-eastern Africa. As these topics are of sufficient interest to bear an examination a little in detail, I shall endeavour to set out in order the observations in respect of them that have occurred to me, and thence to deduce what was the course of information to Ptolemy of the geography of that part of Africa which includes the mountains where the Nile was reputed to rise, of those mountains themselves, and of their name.

That the Arabs, Dean Vincent has observed (*Periplus*, vol. ii. p. 2), were the first navigators of the Indian Ocean, and the first carriers of Indian produce, is evident from all history, as far as history goes back; and, antecedent to history, from analogy, from necessity, and from local situation: and we may conclude that then, as now, the same circumstances threw likewise into their hands the principal trade of the Red Sea and of the coast of Africa beyond it.

Of the intercourse of the early Arabs with the interior of Abessinia, history affords but few and scanty notices; nevertheless these notices point to circumstances of a sufficiently large operation to raise the inference that that intercourse brought them acquainted with all parts of Abessinia long anterior to the era of the Greeks in Egypt.

It has been maintained by Ludolf, upon the authority of Procopius of Gaza, Stephanus, and an Arabic writer cited by him under the name of Uranius, and by Scaliger (in Dean Vincent, *Periplus*, vol. ii. p. 110), that the Abessinians are of Arabian origin. Ludolph says (*History of Æthiopia*, lib. i. c. 1) that they were formerly reckoned into the number of the Sabæans and Hamyarites, and adduces as arguments in proof of this origin the similarity of their customs and physical conformation, and the near affinity of the Æthiopic and Arabic languages, a harmony of which he has appended to his *Æthiopic Lexicon* (2nd edit. 1699). Dean Vincent, on the other hand (vol. ii. p. 107, *et seq.*), finds ground, in the account given by Herodotus (lib. 2. c. 30) of the defection of the 240,000 Egyptians, who quitted the government of Psammeticus and migrated into a country 57 days' march beyond Meroë, for supposing the Abessinians to be of Egyptian origin. But this conclusion of Dean Vincent is somewhat overborne by the subsequent testimony of Herodotus himself, in the 104th chapter of the same book, where he alludes to both the Egyptians and Æthiopians as having existed from time immemorial. Dean Vincent considers the mixture of Arabic in the language of the Abessinians to be accounted for from their constant communication with Arabia in the earliest ages; and still more, from the common origin of language in Egypt and the adjoining countries.

Without venturing to determine whether or not the Abessinians were descended from Sabæan tribes, who in early times migrated into Abessinia, there is reason to conclude that successful irruptions of the Sabæans into that country at some remote period took place. Pococke (*Specimen Historiæ Arabum*, edit. 1806, p. 60) cites, on the authority of Abu-l-Feda, El Jannabi, and Ahmed-ibn-Yusuf, the eighteenth king of Yemen after Kahtan (Joctan of the Scriptures), by name Afrikús, as having given his name to Africa; and the twenty-third king, by name Nashero-l-Ne'am, and the successor to Balkis, alleged to have been the Queen of Sheba who visited Solomon, and who is in like manner mentioned by M. Marcel,\* on the authority of the Arabian geographer, Noury-el-Baquí, as having made considerable conquests westward in Africa. El Baquí is also stated by M. Marcel to add, that the Sabæan dominion embraced Egypt and the adjacent countries, and, that the people of Nubia had in his time, which was about the year 1400 A.D., resident at Dongolah, a king said by them to be descended from the ancient Hamyarites; and Bruce, whose account is confirmed by MM. d'Arnaud and Thibout (*Bulletin de la Société Geogr.*, Nov. 1842. p. 381, and Feb. 1843. p. 93),

\* 'Mémoire sur les inscriptions, &c. dans la description de l'Égypte,' vol. xv. p. 14. Edit. 8vo.

observed traces of the Sabæan worship of the moon among the Shillooks and Dinkas, on the banks of the White Nile, not far above its junction with the Abessinian Nile, so late as the last century. Concurrent with the testimony of the Arabian historians we have that of Herodotus, who states (lib. ii. c. 100 et 140) that Egypt was twice ruled by Æthiopian kings: firstly, by eighteen, in the period of the three hundred and thirty generations which prevailed between Menes and Mœris; and secondly, in which he is more particularly confirmed by Diodorus Siculus (lib. i. c. 65), by an Æthiopian king of the name of Sabakos, who governed the country for fifty years and then retired again into Æthiopia. Sabakos, however, according to the collation of Berosus in Josephus (lib. xl. c. 1), was only the first of three Æthiopian kings who ruled over Egypt during forty years of the period assigned by Herodotus and Diodorus to Sabakos alone. Of this last Æthiopian rule we have the further particular from Herodotus of its having been the second in order before that of Sethon, with whom Herodotus states (l. ii. c. 141) Sennacherib made war, which would make Sethon the same with Tirhakah the Æthiopian, mentioned in the 2nd Book of Kings (c. 19), and by Isaiah (c. 37), and the æra of Sennacherib, which was from 713 to 712 B.C., coincident with part of the reign of Sethon. Sethon was preceded by Anysis, who had been previously dispossessed of the kingdom by the Æthiopians, and could not, upon his restoration, therefore, after the long interval of the Æthiopian dominion, have reigned more than a few years: consequently either Anysis or Sabakos, or the last of the two successors of Sabakos, if there were three Æthiopian kings, must have been the same with the King of Egypt mentioned in the 2nd Book of Kings (c. 17) as So, who conspired with Hosea, king of Israel, against Shalmaneser, the predecessor of Sennacherib in Assyria, about the year 722 B.C.; and the second Æthiopian reign in Egypt would date from about the year 770 or 760 B.C. to the year 720 B.C. This date, then, is too much posterior to that of the kings of Yemen, stated to have invaded Æthiopia, to admit of any supposition of identity between them and the Æthiopians of the second Æthiopian dynasty in Egypt; and as there is no mention of later conquests by the Sabæans in Æthiopia, we must recur to earlier events in Egypt, on which, faint as the light of history falls, it yet affords some gleams by which we may venture to discern the presence, in Æthiopia, Nubia, and Egypt, of a king of Yemen.

It has been stated that Nashero-l-Ne'am, the twenty-third king of Yemen, succeeded the Queen Balkis, alleged to have reigned over Yemen in the time of Solomon, who ruled over Israel and Judah from the year 1015 B.C. to the year 976 B.C. This date, if we allow for the duration of the reigns of Queen

Balkis and of Nashero-l-Ne'am sixty years, which may be done without violence to probability, would place the termination of the reign of Nashero-l-Ne'am in the year 916 B.C., which would very well reconcile his conquest of Æthiopia and Egypt with the era of Zerah the Æthiopian, mentioned in the 2nd Book of Chronicles (c. xiv.) as having gone up against Asa, King of Judah, by whom he was vanquished and pursued to Gerar, in the direct road from Judæa to Egypt, about the year 922 B.C.

It must be acknowledged that the above coincidence does not harmonize with the subsequent series of rulers of Egypt given by Herodotus, but it is not on that account the less a coincidence as between the records of Scripture and those of Arabian history; and it receives additional support from the fact of the early invasions of Egypt referred to having been from the side of Æthiopia; for, in the absence of all historic notice of invasions of Egypt from any other quarter by early Arab tribes, it would necessarily follow, if the Sabæans extended their irruptions as far as Egypt, that they must have come through Æthiopia, which, again, they could only have accomplished by first securing for themselves a passage through Abessinia. There is, therefore (however little we may be able to define particular events), some concurrent historical evidence in favour of the general conclusion to be drawn from the Arabian writers, that the Sabæans did at one time invade and conquer Abessinia and the adjoining countries.

Ludolf's arguments, from the affinity of the language and customs of the Arabians and Æthiopians, for a common origin of the two people, may admit of qualification to the extent of supposing that affinity to be due to the dominion only of the Arabs over the whole or greater part of Abessinia in an early age. But beyond that, historical experience, from the very ground which he takes, does not warrant a rejection of his hypothesis. It is not merely the oral but literary, form of the Æthiopic which corresponds so closely with the ancient Arabic; the characters, even, in which the Æthiopic is written being, as observed by Mr. Bird in his description of some Hamyaric inscriptions found at Aden and Sana (Journal, Bombay Branch, Royal Asiatic Society, October, 1844), almost similar to those of the Hamyaric writing.

If we were to recur to Dean Vincent's suggestion of the common origin of language in Egypt and the adjacent countries for an explanation of the close affinity subsisting between the Arabic and Æthiopic, we might suppose that a still closer affinity would be discoverable between the Æthiopic and the languages spoken by the descendants of Cush, who peopled, besides Africa, Assyria, Mesopotamia, and Judæa; but whatever may have been the characteristics of the language originally spoken in Æthiopia, Ludolf expressly states (lib. i. c. 15) that the affinity between

the existing Æthiopic and the Chaldee, Syriac, and Hebrew, is remote, as compared with the closeness of its affinity to the Arabic.

Nor is Dean Vincent's argument of mere voluntary intercourse, if it is to be so understood, between the Æthiopians and Arabians sufficient wholly to account for the similarity of their languages. An intercourse between races of the same stock, such as existed between the descendants of Joktan and Peleg, of Isaac and Ishmael, may furnish cause for lingual congruity, as of the Arabic with the Hebrew; but it may be suggested whether it would not be as reasonable to attribute the prevalence of Celtic in some of the languages of Western Europe to other than causes of former irruptions of the Celts into the districts where it is found to prevail, as to assume that the influence of Arabic upon the language of Æthiopia has not been the result of circumstances of conquest.

We are, therefore, if the above statements and arguments be consistent, justified, as well from incidents of language and of custom as of history, in supposing that the early Arabs of Yemen did, shortly after the time of Solomon, possess in dominion Abessinia. To what extent their conquests stretched cannot be known; but Ludolph, in enumerating the minor kingdoms formerly belonging to Abessinia (lib. i. c. 3), and therefore of people formerly under the same national influences, includes among them Inarya and Kaffa. Of these minor kingdoms, Inarya and Kaffa, and all others to the south of the Blue Nile, have been long since overrun by invading Galla tribes, whose language has kept pace with the progress of their encroachments.

In order to judge how far the assumed use of the language spoken by the Sabæan Arabs will account for the occurrence, from their time, of the particular word Qamar in the name of the mountains where the White Nile rises, it will be necessary to trace that word in connection with the general progress of the Arabic language.

Arabic historians (M. Marcel, *Mémoire*. &c., p. 142; Pococke, &c., p. 155) inform us that the ancient language of Arabia was divided into two principal dialects, which took their names from the two most considerable tribes by which they were used; the one was called, from the tribe of Hamyar, the *Hamyaric* dialect; and the other, from the tribe of Qoreish, the *Qoreishite* dialect.

The Hamyaric dialect, supposed to be by far the most ancient, was spoken by the tribes of Yemen descended from Joktan. As a distinct dialect, it has been superseded since the time of Mahomed, by the Qoreishite, and we only recognise some of its peculiarities through notices by more modern authors of words formerly belonging to it.

The Qoreishite dialect was common to the tribes descended from Ishmael, settled in the Hejaz to the N. of Yemen. It was considered to be the more pure dialect. The Koran was written in it; and it has thence become the current language wherever Arabic is spoken.

Although the two dialects have been described by Arabian writers as possessing idioms and terms peculiar to each, we do not find their difference asserted to be so great as to preclude their being considered to constitute, in their fundamental principles of construction and affinity, one language. Those writers themselves, in tracing the derivation and signification of obsolete Hamyaric words, frequently recur to the Qoreishite dialect for an explanation of their etymology (notes *passim* in Pococke); and Pococke adduces, as explanatory of the general character of the Hamyaric, that it approached more nearly to the Hebrew, Syriac, or Chaldee (p. 157), while it is well known that the Qoreishite, as it has descended to us in the later Arabic, is likewise cognate with the same tongues. That many words and phrases should have prevailed in one part of Arabia which were not recognisable by the inhabitants of another part, is not surprising, when we reflect upon how multiplied must have been the sources of vocables to a language which has accumulated (Pococke, &c. p. 158) two hundred synonyms for the name of a serpent, five hundred for that of a lion, eight hundred of honey, and in which one thousand yet leave unenumerated expressions for a sword. But notwithstanding this immense variety of terms, every word in sound and structure conforms to the law of a single language, and evinces thereby that it has been, wherever locally originated, produced in affiliation to a pre-existing parent stock.

However certain it may be that some words of equivalent meaning in the two dialects differed, it is equally certain that others were common to both, and from the nature of language this last class of words would include more generally the names of objects, of which the distinctive qualities known to the speaker were fewest in suggesting attributive synonyms. Such objects would be the heavenly bodies, and those large and individual appearances in nature which great divisions of the human race have been found by common consent, as it were, to designate through succeeding ages by the same specific names. Of the latter kind of such objects, again, mountains, rivers, individual localities, as cities, tracts, and countries, furnish examples; and of the former kind the name of the "sun," which there is every reason to conclude was "Shums" from time immemorial throughout Arabia; since the N.E. peak of the central ridge, about 1600 feet high, of the peninsula of Aden, the sea-port of Saba, the ancient capital of the tribe of Hamyar, who worshipped the sun

(Pococke, &c. p. 5), is still called "Gebel Shumsan," or "mountain of the sun," marking thereby the Sabæan use of the word "Shums." In Hebrew and Syriac the sun is likewise expressed by "Shums."

Although the worship of the heavenly bodies was very general in Arabia (Sale, *Koran*, Preliminary Discourse, p. 17, ed. 1734), and even spread thence to Samaria in the time of Hosea (2 Kings, c. 17), but few of their Sabæan names have been transmitted to us, and of these the name of the moon is unfortunately not of the number. It is only, therefore, by inference, on the principle above ventured to be set forth, that we can assume the principal name for the moon to have been constant with the whole of the Arabs. That name, as it relates to the subject of this inquiry, would be Qamar, which is the word used repeatedly to designate the moon in the *Koran*, now written more than twelve hundred years ago. As used in the *Koran*, written also for wide circulation, the word Qamar must have been then well established; and of a word of this peculiar kind found in the *Koran*, it may fairly be asked, what may not be supposed to have been its previous antiquity? The learned Sale has said (Preliminary Discourse, p. 25) that "the Arabic language is undoubtedly one of the most ancient in the world."

Why the Arabs, upon their first acquaintance with Æthiopian topography, should have applied this specific name to the mountains where the Nile was reputed to rise, can only at this distance of time be matter of conjecture; but that conjecture stands in juxtaposition with other circumstances, which impart to it as much of consistency as is necessary for the present argument.

That conjecture is, either that the Arabs supplanted the original Æthiopic name of these mountains by one derived from a Sabæan source, and that the present local words Gamaro or Gimiro are but corruptions of the Sabæan appellative Qamar, or if Gamaro or Gimiro be regarded as the original Æthiopic name of the mountains, that the appellative Qamar, from the consonance of its radical letters with those of Gamaro or Gimiro, may have been applied as an equivalent, and become generally substituted for those words among all traders, to whom Arabic, as the language of commerce of those parts, was known.

In support of the first hypothesis it is to be noted, that from the moon constituting an object of Sabæan worship (Pococke, p. 5), it is as probable that mountains should have been named after it as after the sun, an instance of which has been already given. Accordingly, the Gebel el Qamar of Africa are not the only mountains known to the Arabs by the name of Qamar. In Hadhramôt, a province of Arabia to the N.E. of Yemen, between the towns of Sherma and Merbath, is a mountain named

Gebel el Qamar (D'Herbelot, Bib. Orient. in v. Comar), and the cape at the southern extremity of the peninsula of India, called by Europeans "Cormorin," is likewise named by the Arabs Qamar or Qomr (*idem* in v. Comar). It would, therefore, not be surprising if the early Arabs had applied a similar designation to African mountains.

In support of the second hypothesis, it is a curious coincidence that a chief signification given by Ludolf (Lexicon, &c.) of the Æthiopic word Qamre (spelt with qof. mai, rees) is fornix, camera; and by Castell (Lexicon Heptaglotton), fornix, instar ædificatum; and that a further signification by Ludolf, from the use of the same word in a book called 'Magic Prayers,' is "Sphæræ planetarum, in specie lunæ." The only word approaching Qamar in the Coptic is Gom or Jom (spelt with gangia, ou, mi) signifying (Peyron, Lexicon) vis, robur, potentia, which is in affinity with the idea of the mass and firmness of a mountain, as fornix, &c. is with the form of it. There are, therefore, some slight grounds for assuming that Qamre may have been an original term in some Æthiopic dialect to express the idea of mountain, or that it may have been an original Æthiopic designation for the mountainous tract which now bears the name of Gamaro or Gimiro; and it cannot be unreasonable to assume, that the early Arabs might have converted those words into their own homonymous word Qamar, or Qomr. or Qomri, while we find so respectable modern an authority as Malte Brun (Geogr. vol. ii. p. 215, Engl. ed.) talking of a high country in Yemen named "Gebel," and our navigators converting "Ras el Fil," meaning "Cape Elephant," and the same with the Mons Elephas of Ptolemy (lib. iv. c. vii.), into "Cape Felix" (Horsburg, Directory, &c., vol. i. p. 227, ed. 1826).

So far, then, the early intercourse of the Arabs with Abessinia has been regarded as sufficient to account for their knowledge and designation of the Abessinian Mountains of the Moon. Their subsequent intercourse with that country and with Egypt during the time of the Ptolemies and the Romans, and the derivation from them, in that period, of the sense of Mountains of the Moon, to the Greek geographers, is now to be considered.

After the accession of the Ptolemies to Egypt, the importance of the trade in the Red Sea soon began to attract their attention. Ptolemy Philadelphus, the second of the dynasty, founded at the head of the Heroopolitan Gulf the city of Arsinoë, which offered to the maritime trade on the east of Egypt a depôt at the shortest possible distance from Alexandria, the great emporium of its Mediterranean commerce on the west; and finding afterwards that the north winds, which blow down the Red Sea for nine months in the year, opposed a dangerous obstacle to the

passage of merchandise in ships in its upper course, he built, to obviate that difficulty, and possibly at the same time to leave Palestine and Syria less independent of a traffic through Egypt, on the African shore, 400 miles to the south of Arsinoë, the port of Berenike, where the cargoes were unladen from the ships, and forwarded in twelve days by land to Coptos, in Lower Egypt; and then, again, with the view of still further benefiting the trade, he established the second port of Berenike, called also Ptolemais Theron, 350 miles (Capt. Moeresby's Chart of the Red Sea) to the south of the first Berenike, and on the site, probably, where the Æthiopian traders had been accustomed to resort to meet the vessels from Arabia. when the trade came to Egypt through this part of Æthiopia (Pliny, in Sharpe's History of the Ptolemies, p. 73).

But it was in the succeeding reign of Ptolemy Euergetes, which commenced about 246 years before the birth of Christ, that the more extensive commerce of the Red Sea became appropriated by the Greeks. Towards the end of his reign Ptolemy Euergetes undertook an expedition to Adulis, the modern Maszawab, whence he pushed his conquests along both shores of the Red Sea and on the African side, subjugated the sea-port states as far as Zingebär, and the countries inland as far as Shawä, a province to the south-east of the first Nile. The record of this expedition was preserved in the Adulitic inscription discovered by Cosmas in the year 525 of our æra, and 750 years after the visit of Ptolemy to Adulis (Cosmas, *Topographia Christiana*, in Dean Vincent, &c., vol. ii. p. 531 *et seq.*).

Although the more extended trade in the Red Sea must, pursuant to the measures of the first three Ptolemies, have passed to the Greeks, the local trade from port to port, and between Arabia and Africa, must still have remained, as it always has, with the Arabs, whose local situation and habits of life have ever qualified them, better than strangers, for intercourse with each other and with the adjacent tribes of Africa.

From similar circumstances in respect of the Abessinians and those with whom they traded inland, it may be affirmed that the Greeks did not participate in their inland trade between their southern provinces and the sea-coasts of the Red Sea and Gulf of Aden, which was most probably then carried on, as in the time of Cosmas (*idem* in Dean Vincent, &c.; vol. ii. p. 541), and as at this day, by themselves.

Thus may it be presumed that the Greeks under the Ptolemies obtained no larger share in the commerce of the Red Sea than has fallen to the lot of others who have since commanded its navigation. The trade from distant places, as it affected Egypt, was in the hands of the Greeks. The local trade, between the neigh-

bouring ports of Arabia, and of Arabia and Africa, and the internal trade of Abessinia, was with the Arabs and Abessinians.

As the Greeks only entered into a navigation in the Red Sea already well established by the Arabs, they would naturally have derived their first knowledge of its incidental geography through Arabian information and an Arabian nomenclature; and whatever names had been applied to places in and about the Red Sea, by the Arabs, would come down to the Greeks with the Arabian stamp upon them unaltered.

There is no ground even for inferring that they could have acquired any knowledge of Abessinia, particularly of its southern provinces, except through the route of the Red Sea. The same natural difficulties which now preclude caravans from travelling from the countries about the sources of the Nile into Egypt, by land, must have operated with equal force, so long as nature has maintained in those parts the same aspect; and from the commencement of commerce, all information of the provinces of Abessinia would have travelled, first, from those provinces to the sea-coast, and thence, by the prevailing route of trade, into Egypt.

When the Romans succeeded the Ptolemies in Egypt, the trade in the Red Sea would still have maintained the same comparative relations, and the knowledge of the adjacent countries in Africa to the geographers of the Roman æra, would be but the progressive advancement of that already acquired by their predecessors under the Ptolemies.

Under the Roman dominion of Egypt, in the reigns of the Emperors Adrian and Antoninus, in the second century of the Christian era, lived Ptolemy the geographer. That he did not visit the places which he describes, to the south of Meroë, is to be inferred from his errors of latitude; it being not too much to affirm that the altitude of the pole, by which his observed latitudes were measured, might have been ascertained by mere mechanical contrivance within the reach of any ingenious mind, with more precision than his results evince. His knowledge, therefore, of the geography, with its nomenclature, of north-eastern Africa would have been derived through the works of preceding writers, and the common channel of information on the subject, to him and them, which the trade in the Red Sea, it has been shown, had so long kept open. This nomenclature, then, would have likewise reached him, as it was known to its first discoverers the Arabs, and, so far as it originated with them, would have been in terms of their language; and if they had already adopted for the mountains, where the Nile was reputed by them to rise, the name of Gebel el Qamar, the sense of these words would have been known to the Greeks through their communication with the Arabs, and have been rendered by the equivalent expression in Greek of *Σεληνης Ορος*.

Of what high antiquity are the names of many places in Arabia and the opposite part of Africa, may be seen by comparing the existing names of provinces and towns and tribes with those given in the earliest writings. In the Adulitic inscription, for instance, are mentioned, in Africa, Agame, Ava, Ath-Agau (the Agows, near the sources of the Blue Nile), Saméné (Samen), Zaa (Shawa), At-Almo (Lam-Almon), Zingabéné (Zingebär), with others identified by Dean Vincent (vol. ii. p. 544 *et seq.*) from the names of the same places given by Bruce; in Arabia also Sabea. The name of the town of Aden in Arabia has existed from time immemorial; and the Arabian province of Hadharmôt still bears the name of the son of Joctan (Gen. xi.); the province of Irak, that by which it was designated in the time of Nimrod (Gen. x.), and the Arabian name of Egypt, "Misr," has been transmitted to us from that of Mizraim, the son of Ham (*idem*). Why then should it be assumed on any one ground that the "Gebel el Qamar," or "Mountains of the Moon," were not known to the Arabs long before they were heard of by the Greeks? Every presumption is against such a conclusion. The early history of the Arabs—their enterprising spirit—their prior navigation of the Red Sea—the extended use of their language—mark them to have been the first instructors of the Greeks in the geography of the regions on the shores of the Red Sea without the bounds of ancient Egypt.

The above considerations have been offered at length, because they involve, together with the early knowledge of a particular place to the Greeks, the origin of their acquaintance with the geography of a great part of Arabia and of north-eastern Africa. The priority claimed for the Arabs in these respects appears even in their name "Níl," for the Nile itself in its passage through Egypt; and a short digression to show the probability of their having derived that name from a source anterior in date to the use of the Greek word Νεῖλος or the Latin Nilus, may not be deemed too irrelevant for admission. Abd el Latýf (p. 191, White's ed.), who wrote his book on Egypt at the close of the twelfth century, and after him, Ferozabâdi, who died in 1414 A.D., states that the word Níl as an appellative for the river Nile is derived from the verb Nál, to bestow, to give, which with kesra under the nun in place of futha, and a yé in place of the alef, becomes the name of that which is given. According to Eratosthenes (in Jablonski, *Pantheon Ægyptiorum*, pars ii. p. 159) and Diodorus Siculus (lib. i. c. 63) the Νεῖλος was originally called Αἰγυπτος, and obtained its name of Νεῖλος after an early king of Egypt, who "greatly distinguished himself by constructing beneficial works in connection with the river," from which it would follow that the Greeks adopted their term of Νεῖλος from an Egyptian word. Jablonski (pars ii. p. 156) thinks that the name of the Nile is

derived from two Coptic words signifying "certo et determinato tempore adscendens." In some places in Scripture (2nd book of Kings, c. 24, v. 7, &c.) the Nile is denoted by the Hebrew word, *Nehhl*, meaning primarily a narrow valley containing a stream, particularly which at certain periods overflows (Dr. Lee's Hebrew Lexicon; M. Marcel, *Mémoire sur le Meqias*, &c., *Description de l'Égypte*, vol. xv. p. 41), and having nearly a similar signification through the sister-dialects of the Chaldaic, Syriac, Samaritan, and Persian. Dr. Lee makes the Hebrew *Nehhl* cognate with the Arabic *Nahl*, which signifies a first draught with which camels, &c. are watered; but there is also an Arabic word *Nehhl*, signifying to bestow, and nearly synonymous with *Nál*. In all these words, and in the corresponding word in Æthiopic also, according to M. Marcel, there is a sufficient concurrence of the same radical letters, to render it extremely probable that some form of the present word *Nil* has been a name for the Nile with the Arabs from the commencement of their language, and that it is an offspring from an eastern root whence the name of the King *Νεῖλος* was also derived.

Whilst finally concluding these philological remarks, I would suggest whether the signification of the words *Mono Moezi* has any relation to the sense of *Moon*, and whether some clue to their meaning may not be deduced from the Coptic words *Moone* or *Mono*, signifying (Peyron, *Lexicon*) *mansio*, *habitatio*, also *portus*; and *mes gignere*, whence *mese generatus*, and *mesi*, *masi*, *pullus*. It is just possible that the compound *Mono Moezi* might imply people of the Port (of the lake *Zambezi*). M. Jomard (*Voyage à Tembaktú par René Caillié*, vol. iii. p. 525) suggests that the word *Tembaktú* includes the Berber article *ta*, which appears to resemble the feminine Coptic article  $\tau$ . It is, however, a subject not yet at all investigated how far the Æthiopic, Coptic, and Arabic may have entered into the general basis of African languages.

It now remains to submit a few reasons in connection with physical geography which have induced me to think that M. d'Abbadie is right in his conclusion that the *White Nile* rises in *Inarya*, and this I desire to do, it must be remembered, in reference only to the general ground on which I have essayed to put the question, in stating it to be one of whether the waters and consequently main sources of the *White Nile* are derived from *Inarya* and *Kaffa*, or whether the rivers formed by the waters of those districts are to be looked upon as tributary only, and secondary to the main stream of the *White Nile*, of which the principal origin is to be sought for to the south of the 2nd degree of south latitude.

If we regard, relatively, for the present purpose, the configura-

tion of Africa, we find that on the N.E. the Red Sea constitutes an axis of depression, on either side of which continuous mountain ranges have been thrown up parallel to its coasts; the one, on the E., in Arabia; the other, on the W., in Africa. The African range separates the valley of the Nile from the Red Sea, and is in no place broken down so as to admit of the passage of the waters of the Nile into the Red Sea. Towards the lower part of the Red Sea, and afterwards in the Gulf of Aden, where the shores of Africa and Arabia gradually recede from each other, until the easternmost point of Africa is attained and the shore of that continent turns abruptly round to the S. and W., the altitude of the mountains on either side rapidly increases, as if the forces which upheaved them, then becoming divergent, had also acted with more marked and distinct effect. On the Arabian side the range which there separates the Tehama, or low tract bordering the sea, from the upper country, cannot, as far as my observations at a distance enabled me to judge, be less than 5000 feet high. But notwithstanding that height, and that this part of Arabia is within the influence of the S.W. monsoon (Niebuhr, *Description de l'Arabie*, p. 3), no rain falls in the Tehama at the period of that monsoon, and the rain which then falls in the upper country is too scanty to suffice even for purposes of cultivation (*idem*, *Voyage*, vol. i. p. 326). On the African coast also, within the Red Sea, no rain falls at the time of the S.W. monsoon to the eastward of the African range (Bruce, *Travels*, &c. vol. iii. p. 65, 4to. edit.); while to the westward of the same range the S.W. monsoon prevails, with greater or less intensity, from the Indian Ocean to Nubia, being more regular over Abessinia and the mountainous regions to the south (Bruce, vol. iii., Ritter, vol. i. p. 222, and *Meteorological Tables*, vol. iv. p. 663), and interrupted in Darfour in long. 28° 8' E. and lat. 14° 11' N., and in the districts W. of the White Nile (Browne, *Travels*, &c. pp. 234-254, and *Meteorological Tables*, p. 475). On the coast of Africa outside the Red Sea, in the Gulf of Aden, so much rain falls at the period of the S.W. monsoon as to prevent the passage of Kafilehs from the interior, and to cause the traders frequenting the entrepôt of Berberah then to disperse and seek a drier asylum till the return of fine weather in October, which rain is probably owing to the contiguity of that tract to the high southern part of the Abessinian plateau and Indian Ocean, and also to its own hilly nature.

Now, since the S.W. monsoon along the African coast takes a direction from S.S.W. to S. (oral information from Capt. Moorsby, late superintendent of the survey of the Red Sea), and the high mountains of the Abessinian plateau, including Kaffa and Inarya, intercept the rain of the S.W. monsoon in what would otherwise be its passage across them to the mountains of Yemen, in

Arabia, it is clear that if there were any other mountains on the south side of the mountains of the Abessinian plateau higher than or even as high as themselves, the rain of the S.W. monsoon would in like manner never reach them, or at most reach them with its force much modified; but the contrary of each of these conclusions is the fact: wherefore it follows that the Abessinian plateau constitutes the highest land in Africa within the influence of the S.W. monsoon; and it would be just, on this ground alone, to infer that the large tributaries to the White Nile, which are known to flow from the southern part of the Abessinian plateau, where its mountains are by positive testimony likewise highest, are the true sources of the main stream.

If we are to concede, with M. d'Arnaud that the Saubat, joining the White Nile from the E. in  $9^{\circ} 17' N.$  and  $29^{\circ} 7' E.$ , brings nearly half the volume of waters to its stream; the Misselad, joining it from the W. in  $9^{\circ} 11' N.$  and  $30^{\circ} 34' E.$ , a large volume of water; and the Shooa-berri, coming from Inarya, a considerable portion likewise; there would not appear to be a sufficient volume of water left to be accounted for to raise the presumption that the main stream can yet come from the S. The Shooa-berri itself, in the map which accompanies M. d'Arnaud's paper, is made to be the upper course of the White Nile.

Assuming, however, that the main stream of the White Nile does come from a part of Africa near its eastern coast, to the S. of the 2nd degree of S. latitude, let us see what are the concurrent circumstances involved in such an assumption.

The mouths of Damietta and Rosetta of the Nile are in  $31\frac{1}{2}^{\circ}$  of N. lat., and, supposing its source to be one degree and a half to the S. of  $2^{\circ} S.$ , the course of the river, in latitude alone, would extend over 35 degrees; and, allowing for variation of longitude and tortuousness of the stream, its actual course would not be less than a distance equivalent to 45 degrees of latitude, that is, than 2700 geographical miles.

No sufficient estimate of the elevation of the source of a river can be deduced from the inclination of its bed, as measured between any two or more points in its lower course, in consequence of that inclination increasing in an irregular, though generally accelerated ratio, as the source is approached; but by confining such a calculation within the limits of observed data, we may obtain a result for the elevation of its source, than which the true elevation cannot be less.

Keeping this principle in view, we have, in the case of the White Nile, the following data from which to calculate the inclination for the first half of its course, of its bed, and approximate elevation of its source.

In the delta, between the Mediterranean and Kahireh, a dis-

tance by the Rosetta branch of about 120,000 toises, equivalent to 234,000 mètres, or rather more than 2 geographical degrees, the inclination of the stream will of course vary with the height at Kahireh of the surface of the river, which ranges from 13°246 mètres (= 43·458 ft. Eng.) on occasions of high Nile, to about 5 mètres (= 16·404 ft. Eng.) when the flood has subsided, above the level of the sea in the Mediterranean (M. G. Le Père, *Observations sur le Profil de Nivellement de la Vallée du Nil; Description, &c.*, tome xviii. 2<sup>e</sup> partie, p. 88), and may be taken at the latter period, when the height of the water is stationary at its minimum, at about 2 inches (= 2·13155 ins. Eng.) in 1000 toises (= 76735 ins. Eng.), equal to  $\frac{1}{30000}$  (M. Le Père aîné, *Mém. sur la Vallée du Nil, &c.*, tome xviii. 1<sup>e</sup> partie, p. 566).

According to the observation of M. Caillaud (*Voyage à Méroë*, vol. iv. p. 74), the mean altitude of the mercury in the barometer at Assouan, on the mornings of the 23rd and 24th of November was 755 millimètres (= 29·725 ins. Eng.) at a temperature of 62°·6 Fahr., and the mean morning altitude for the 9th of November at Kahireh (M. Coutelle, *Observations Météorologiques; Description, &c.*, tome xix., p. 454) is 763·6 millimètres (= 30·0537 ins. Eng.) at 59°·45 Fahr., which would make Assouan about 95·705 mètres (= 313·86 ft. Eng.) above Kahireh. The distance between the two places by the river, measured on the large French map, is about 200 leagues, equal to 8 geographical degrees or 888,889 mètres. The inclination, therefore, of the river between them will be expressed by  $\frac{95\cdot705}{888889} = \frac{1}{9287}$  or in even numbers by  $\frac{1}{9000}$ .

The next place, of the altitude of which we have any distinct notice, is Senaar, on the Blue Nile, about 120 miles above its junction with the White, and situated in 13° 37' N., and being 10° 27 $\frac{3}{4}$ ' to the S. of Assouan, and, by the course of the river, about 13 $\frac{1}{2}$  degrees, equal to 1,500,000 mètres, distant from it. Bruce assigns to the plateau of Senaar an altitude of 4000 feet, equal to 1220 mètres above the sea, in which he is supported by the opinions of Rennell and Humboldt (*Ritter, Geogr.*, vol. ii. p. 251). Then since the stream of the White Nile was found upon examination by M. Caillaud to be much more rapid than the stream of the Blue Nile, and its volume of water half as large again (vol. ii. p. 201), we are justified in assuming that the point in the White Nile corresponding, in distance from the junction, to Senaar on the Blue, will be at least as high as Senaar, that is, 1220 mètres above the sea. If from this quantity we deduct 110 mètres for the altitude of Assouan above the sea, there will remain 1110 mètres for the rise of the bed of the White Nile in the 13 $\frac{1}{2}$  degrees, or 1,500,000 mètres, of its course next above Assouan, which will give a rate of inclination of  $\frac{1}{1360}$ ; and, supposing only

this rate of inclination to be continued for the remaining  $21\frac{1}{2}$  degrees, equal to 2,388,891 mètres, of the river's assumed course, the further elevation attained through that space would be 1756. mètres, equal to 5760 feet English; to which if 4000 feet, the altitude of Senaar, be added, the result of 9760 feet would express the elevation of the source of the White Nile above the sea. That such an amount of elevation is within the truth we have the corroborative fact by Bruce that the source of the lesser river, the Blue Nile, is from 9000 to 10,000 feet above the sea.

Before proceeding to make further use of this result, however, in order to meet any objection which may be urged of the altitude of 4000 feet for Senaar, and for the corresponding point on the White Nile, being too great, let us take this altitude at one-half only, or 2000 feet, equal to 610 mètres, from which, if the 110 mètres for the altitude of Assouan be deducted, there will remain 500 mètres, and the inclination of the river will become  $\frac{1}{3000}$ , which inclination, we will suppose, as before, not to be exceeded in the remaining  $21\frac{1}{2}$  degrees, or 238,891 mètres, of the course; we shall then have an altitude through that space of  $\frac{238891}{3000} = 796\frac{1}{4}$  mètres, or 2612 feet English; to which if the assumed altitude for the point corresponding to Senaar, of 2000 feet, be added, we shall have for the elevation of the sources of the White Nile above the sea 4612 feet. But as the primary streams constituting the sources run in valleys, and are, by hypothesis, supposed to collect a considerable drainage within the tropics, they must be accompanied by mountains of additional height above them; and we may fairly assume, from the foregoing data, the general height of the mountains where the Nile rises to be not less than 6500 feet above the sea.

That tropical mountains of such an altitude, when exposed to the moist winds from seaward, are sufficient to cause in abundance the periodical rain incidental to mountainous regions within the tropics, is, I think, proved by the occurrence, during the S.W. monsoon, of heavy rains on the west coast of India, where the Syhadree range, running parallel to the coast, and not on an average more than 5000 feet high, has been known to produce on its immediate ridge 280 inches of rain in the year.\* Consequently it would follow, if the upper course of the Nile took a direction, as Dr. Beke would maintain, to the country of Mono Moezi, situate to the S. of the line, near the E. coast of Africa, that the mountains about its source would produce heavy and continued falls of rain as the sun became vertical to them, which would cause an accession of waters to the Nile at some time between the autumnal and vernal equi-

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\* This result was indicated by a rain-gauge kept upon the Mahabuleshwar range, and was communicated to the author on the spot.

noxes. But we know that such is not the case, since the Nile does not begin to rise in Egypt till the end of June, which is about six weeks after the regular setting in of the rains in Abessinia. If the White Nile received an accession of waters shortly before or at the time of the vernal equinox, a rise in the river at Kahireh might be expected in May. But so rare are the instances when a rise of the Nile has been observed at Kahireh in May, that its occurrence is regarded as a phenomenon (M. Jomard, *Bulletin de la Société Géographique*, Feb. 1844, note, p. 138), and may be accounted for on the supposition that the light showers which prevail in Abessinia through February, March, and April have been heavier than usual.

According to Bruce (vol. iii. p. 745, *et seq.*, ed. 4to.), the aggregate quantity of rain falling at Gondar, during the three last-mentioned months, or rather during February and March, for scarcely one-tenth of an inch falls in April, does not exceed one inch; and it would appear to be brought to Abessinia by a continuation of the north-eastern monsoon (Horsburg, *Directory*, &c., vol. i. pp. iv., 125, 251, ed. 1826), which takes a direction from the Indian Ocean towards this part of the continent of Africa during the southern declination of the sun. The E.S.E. winds which prevail till March off the E. coast of Africa, may also contribute to the same result. If these spring rains in Abessinia are heavier than usual, they may produce a premature rise of the Nile, as was observed at Kahireh in 1843, when a small increase of the waters occurred as early as February, and again in May and June (M. Jomard, *Bulletin de la Société Géographique*, February, 1844, p. 138). Had this increase been due to the periodical rains falling to the S. of the equinoctial line, the effect upon the river would have been more regular, and of perennial occurrence; whereas the irregularity which characterised the premature rise in 1843, is just what might have been expected to result from the irregular rain which prevails in Abessinia in the spring of the year, having fallen at intervals more plentifully than usual.

The preceding arguments, from meteorological and hydrographical data, to show the probability of the White Nile being wholly confined to the N. of the line, and being mainly dependent upon the southern regions of the Abessinian plateau for its waters, have been adduced as aids, in the absence of that certain knowledge of the physical configuration of the country which would enable us to dispense with them. Such knowledge as we have of this configuration I shall now examine, and it will be found, as far as it goes, to conduce to the same conclusion.

In a former paragraph I traced the range on the N.E. side of Africa to the neighbourhood of the Gulf of Aden, where its elevation was said greatly to have increased. This increase is concur-

rent with the increase of elevation of the whole southern part of the Abessinian plateau, of which the range in question constitutes the boundary towards the sea-coast. With that boundary it turns round to the S. After thus turning to the S. it throws out considerable sub-ranges, which extend quite to the water's edge, where they terminate in a succession of precipices for some degrees southward from Cape Gardafoon. From the southern part of the Abessinian plateau the range would still appear to be continued southerly, though at a greater distance from the eastern coast, and so as to cause the rivers on the one side to flow into the Indian Ocean, and those on the other into the Atlantic. Thus, on the eastern side of this anticlinal ridge, to name the principal rivers, we have the Wäbe, the Gibe (of the E. coast), the Qelemánsi, and the Cuama, or Zambezi, and, on the western, the Zaire, the Coanga, the Cuánene, &c. If our glance be now extended to the whole river-system of Africa, it will be perceived that the great drainage of the continent is towards the Atlantic and Mediterranean. The rivers which fall into the Atlantic, it is not necessary for our present purpose to notice. But the drainage which finds an outlet by the Nile to the Mediterranean would appear to be of that large region which lies to the E. of the high land continued southerly from the eastern flank of the Atlas, until it finds a connection through the interior of the continent, by the W. of Borgou and Darfour (Ritter, *Geogr. &c.*, vol. ii. p. 251), with the secondary ranges running out to the W. from some point in the range above described to be parallel to the eastern coast.

That a range running E. and W., near the eastern coast, does exist, we have the concurrent opinions of all geographers from the time of Ptolemy to the present day. The question is, how is it connected with the range which sends its waters to the eastern coast? In 1613 the Jesuit missionary, Antonio Fernandez (Ritter, *Geogr. &c.*, vol. i. p. 256), when proceeding on his way from Gondar to the eastern coast, on a mission from the king Segued of Abessinia to Pope Paul V. and Philip III. of Spain and Portugal, came to the northern mountains of Inarya in 8 days after crossing the Blue Nile, and, after traversing Inarya for 11 days, descended a high mountain and reached the Gibe, which falls into the Indian Ocean. The second mountain was undoubtedly part of the range which separates the rivers of the Indian Ocean from the waters of the White Nile.

Browne (*Travels in Africa*, p. 473) states, upon native information in Darfour, that at 10 days' journey to the S. of Abú Telfian, which in his map he places in about lat. 13° N. and long. 25° 20' E. of Greenwich, is a range of mountains running E. and W., in which the White Nile is said to rise, called Koumri, and placed in his map in about 8° N. and between

23° and 28° E. He also states that the whole country, from Abú Telfian to the Koumri range, is very mountainous.

Whether the mountains here named Koumri are in reality part of Inarya, and not sufficiently extended to the E. by Browne, there is not information to determine; but, from the general vagueness of native information in Africa, and the difficulty, if not impossibility, of accurately estimating, from the assumed direction of successive marches, the relative bearings of places several hundred miles apart, such a supposition is not inconsistent. We have, however, the evidence of Browne to a mountainous range connected with the high land to the S. of Darfour, and extending from 13° N. along the direction of the 25th meridian to 8° N., and thence turning round to the E. and stretching as far as 28° E.

M. d'Arnaud (*Bulletin de la Société Géographique*, February, 1842, p. 94) testifies that large chains of mountains close upon the White Nile on both sides, in 4° 42' 42" N. and 31° 28' E. (of Greenwich), where his expedition was stopped for want of water in the river at the season of his being there. He also states that the river still continues from that point for a further 50 leagues S., when several branches unite, the principal one of which comes from the E. There our information ends.

Upon these statements it is to be observed, that, as the Nile constitutes the principal valley of the region, which is admitted by all accounts to be very mountainous, it is probable that it is attended with a continuous system of mountains in its whole course through this region; and, that were there an opening through these mountains to the S., or were the Koumri mountains of Browne reflected at their eastern extremity into a southern course so as to become connected with the range of the eastern coast to the southward of the line, the magnitude of the tributary stream to the White Nile, to which the eastern slope of the continuation of the Koumri and the western slope of the coast range would give rise, would be such as not to have left M. d'Arnaud uninformed of its relative importance; whereas the effect of the information which he acquired proved, in his opinion, that the main stream came from the E.

The range from Abú Telfian may possibly trend irregularly round to the E. until its continuation is confounded with the western of the chains through which the river passes in 4° 42' 42" N. (*Bulletin. &c.*, February, 1843, pp. 94, 96), and, having so become identical with that chain, may thence follow the outer tributaries of the White Nile until it unites with the range crossed by Fernandez, which forms the extreme southern ridge of the Abessinian plateau, and separates the waters of the White Nile from those which fall into the eastern ocean. The mountainous chain on the E. bank of the river, in the same latitude, may also be an offshoot

system from the western part of the northern crest of Inarya, which separates the waters of the Blue from those of the White Nile.

I have now given the reasons which have occurred to me for concluding, with M. d'Abbadie, that the White Nile owes its sources to Inarya and Kaffa rather than to a region S. of the equinoctial line. They are of course speculative to the extent that our knowledge of the facts connected with the geography of the White Nile is uncertain. Various, indeed, have been the aspects which this geography has been made to assume. The course of the White Nile stretched by Pomponius Mela and Pliny through the medium of the Niger to the very back of the Atlas, was by Ptolemy brought within more eastern and definite limits. By D'Anville, after a lapse of 16 centuries, the limits assigned by Ptolemy were again curtailed. By Browne and by Rennell a yet more distinct course was proposed: and while the latest writers, including MM. Jomard, D'Ávezac, and Ritter, who, with Africa, have made the Nile their peculiar study, discover their opinions to be shaken on the side of the W., they withhold a precise destination for them towards the E.; thinking, perhaps, with the caution which so many changes have suggested, that the question for its final solution awaits the fuller research which shall fill up the gap subsisting between the observations of M. d'Abbadie and the termination of the journey of M. d'Arnaud.

[*The following Note is inserted for the purpose of correcting some inaccuracies in the Papers by the Messrs. Gregory and Lieut. Helpman.—ED.*]

NOTE on the identity of certain rivers and hills on the west coast of Australia, between the parallels of 28° and 30° south latitude, which have been differently laid down by Capt. King, Grey, Stokes; Lieuts. Roe and Helpman, and the Messrs. Gregory.

THE names and positions of Mount Fairfax and Wizard Hill of Capt. King, admit of no change.

The names of Mount Fairfax, Wizard Hill, and Mount Hill were misapplied by Capt. Grey, who travelled over many hills of very similar appearance. Capt. Stokes and Lieut. Helpman have, by sea and land, cleared up this discrepancy very satisfactorily.

Capt. Grey's names of the rivers admit of no change, as he was the discoverer of the whole of those that flow into the sea between the above altitudes; his distances, only, require correction.

Capt. Grey was shipwrecked in Gantheaume Bay in April, 1839,—he and his party travelled thence to Perth by land, and he named every river which he crossed, and the description which he has given of each is so clear, that no difficulty exists in identifying the whole of them with the more recent accounts of Stokes, Roe, Helpman, and the Gregorys.

The difficulties and privations which Capt. Grey had to overcome (which will be seen by all who read his very interesting narrative) prevented his obtaining latitudes at the various rivers which he crossed, so that the map of his route, which was laid down by himself, from Gantheaume Bay to Water Peak, is too long by 14' or 15', and thence to Perth is too short the same number of miles; all, however, that is required is a simple correction of distances.

In proceeding towards the south from Gantheaume Bay, the first river, the latitude of which Lieut. Roe has very recently observed, is the Hutt, which he finds 7' farther north than laid down by Captain Grey by estimation. The next river is the Bowes, the latitude of which has been observed both by Capt. Stokes and Lieut. Roe, and found to be 11' or 12' farther north than it is laid down by Capt. Grey by estimation; thence the error slightly increases till about the Irwin river and Water Peak, where the error is the greatest, viz., 14½' or 15'.

|                         |            |                                    |
|-------------------------|------------|------------------------------------|
| Thus the Hutt is        | 7'         | too far south in Capt. Grey's map. |
| The Bowes is            | 11' or 12' | , ,                                |
| The Buller is           | 13'        | , ,                                |
| The Greenough is        | 13'        | , ,                                |
| The Irwin is            | 14½'       | , ,                                |
| Water Peak is           | 14½'       | , ,                                |
| The Arrowsmith is       | 14'        | , ,                                |
| Small stream of Grey is | 13'        | , ,                                |

The names and identity of the hills and rivers are as under—

*Names given by Capt. King.*

|  |                      |
|--|----------------------|
| Mount Fairfax of King, Stokes, and Helpman | Wizard Hill of Grey. |
| Wizard Hill of King, Stokes, and Helpman   | Mount Hill of Grey.  |

*Names given by Capt. Grey.*

|  |     |  |
|--|-----|--|
| The Hutt River of Grey                           | is  | The Hutt River of Roe.   |
| The Bowes River of Grey                          | , , | The Bowes of Stokes, Roe, and Gregory.                           |
| The Buller River of Grey                         | , , | Stream without name in Gregory.                                  |
| The Chapman River of Grey                        | , , | The Chapman of Stokes, and stream of Gregory.                    |
| The Stream similar to those to the North of Grey | , , | The Buller of Gregory.   |
| The Greenough River of Grey                      | , , | The Greenough of Stokes, and the Chapman of Helpman and Gregory. |
| The Irwin River of Grey                          | , , | The Greenough of Helpman and Gregory.                            |
| Water Peak of Grey                               | , , | The Mount Hill of Helpman and Gregory.                           |
| The Arrowsmith River of Grey                     | , , | The Irwin of Helpman and Gregory.                                |
| The small stream south of the Arrowsmith of Grey | , , | The Arrowsmith of Gregory.                                       |

The Messrs. Gregory have sought to identify the rivers and hills of Capt. Grey by latitude only, which in the present instance is untenable, as Capt. Grey had no observations for latitude.

To show that the Arrowsmith of Grey is not to be mistaken with his Irwin, or with any other river on that part of the coast, in size, fertility, &c., it only remains to quote Capt. Grey's own description, which is this:—

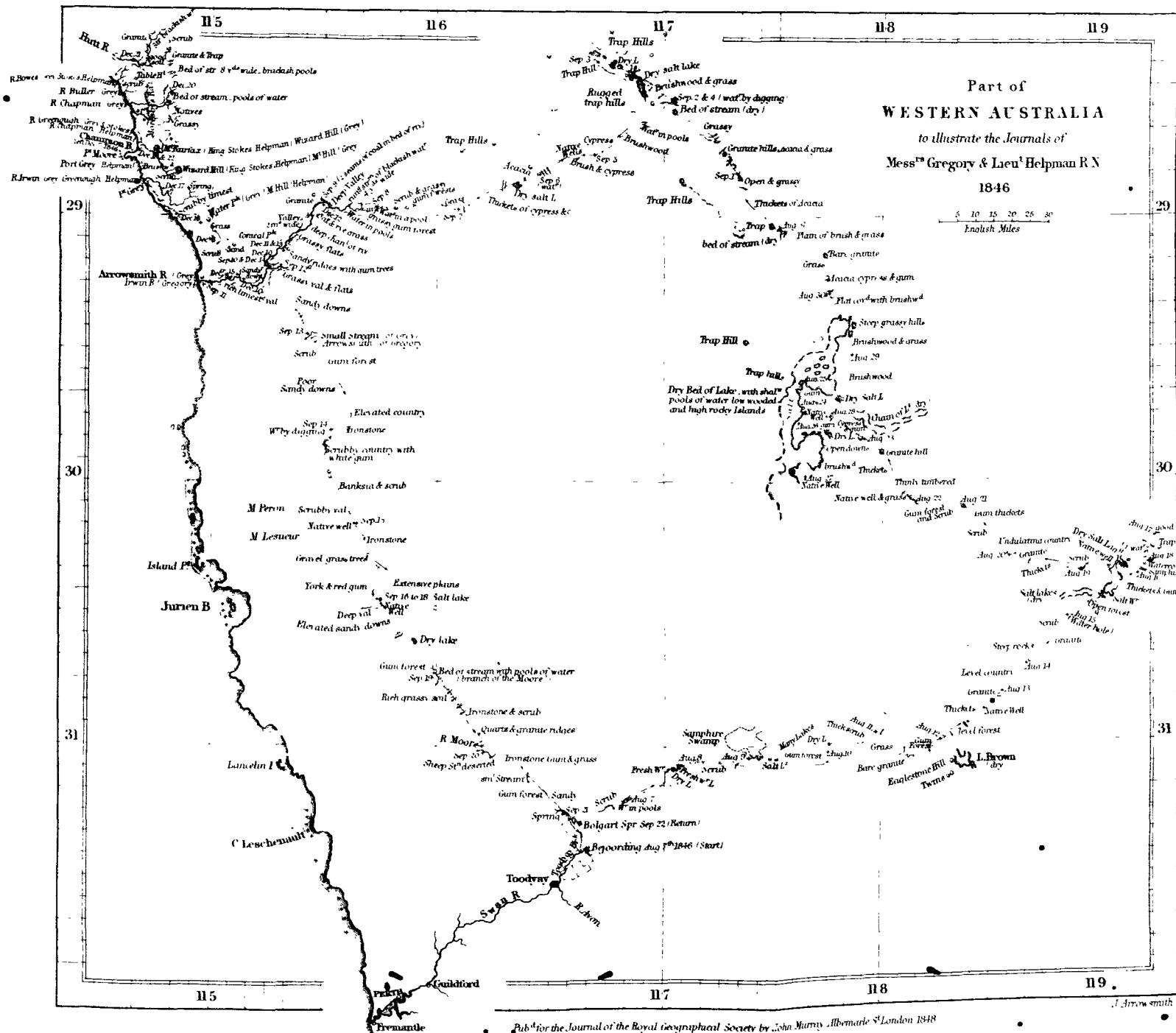
“The Arrowsmith is in a rich, flat, fertile valley; it is a very large river; its bed is 200 yards wide, and 50 to 60 feet deep; the trunks of

immense trees, washed down in the floods, lie scattered on the ground about its banks; no water in the river where we crossed, without digging a few inches in the sand—large pools immediately above and below us. It drains extensive valleys running north and south between the interior range and the sandy limestone range parallel to the coast—it probably comes through the range; its mean course from the interior appeared to be from E.S.E.; many natives came to drink at it. From a range  $1\frac{1}{2}$  mile south of the river is a fine view of the rich valleys which this important river drains.”

The misapplication by Messrs. Gregory of the name of Irwin to this river, is the cause of all the other misapplications of names to the northward, as far as the Bowes

J. A.

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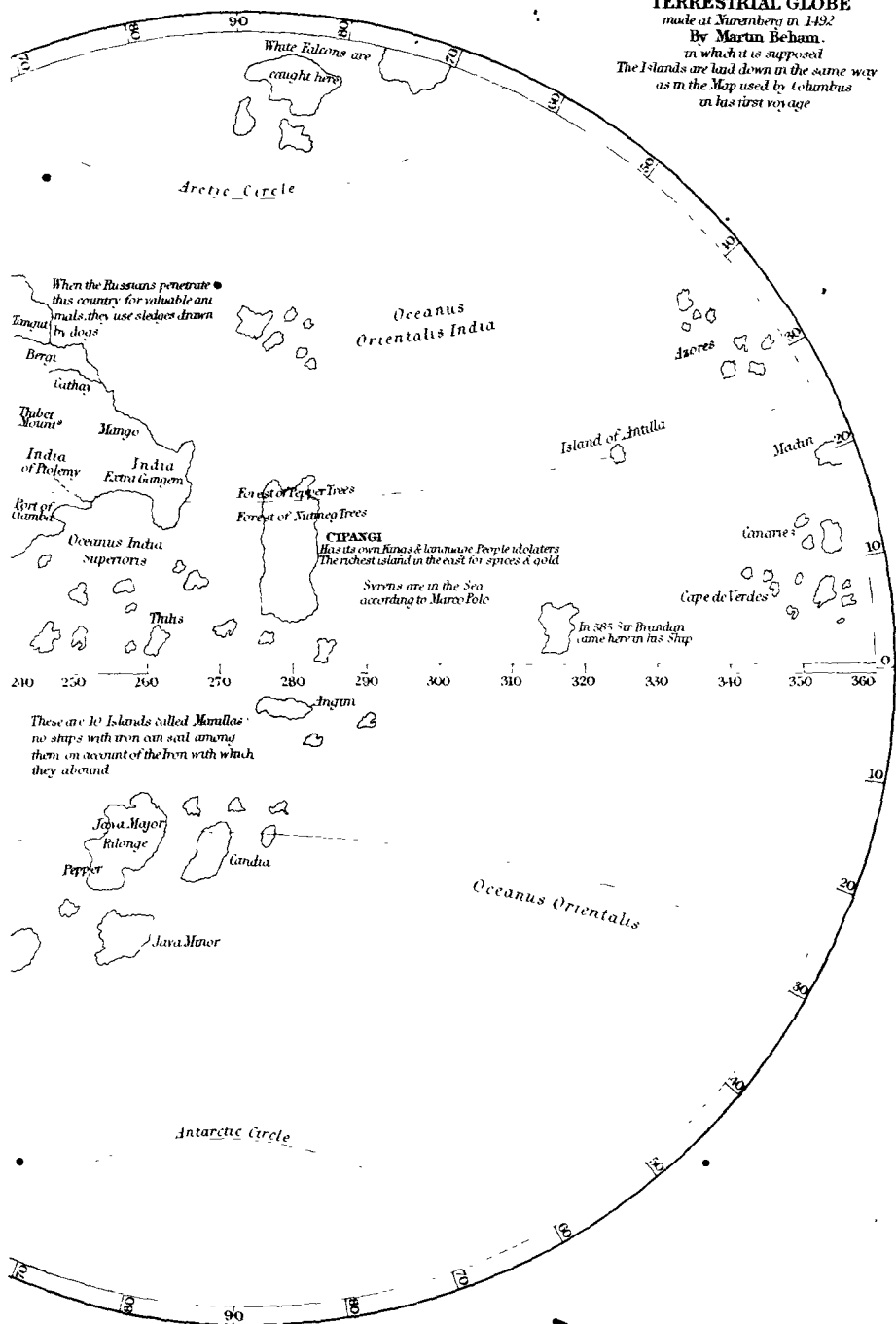




Part of a  
**TERRESTRIAL GLOBE**  
made at Nuremberg in 1492

By Martin Behaim.

In which it is supposed  
The Islands are laid down in the same way  
as in the Map used by Columbus  
in his first voyage





VIII.—*Depression of the Dead Sea and of the Jordan Valley.*

By Dr. EDWARD ROBINSON, of New York.

[Read November 22, 1847.]

THE deep depression of the Dead Sea below the Mediterranean appears never to have been suspected, down to the time of its actual discovery; and no experiments were ever made to ascertain the true level until March, 1837. At that time Messrs. Moore and Beek, in attempting to survey the Dead Sea, were led to examine the question of its comparative elevation by means of some experiments on the boiling point of water. They were greatly surprised at the results, which indicated a depression of about 500 English feet.\* A month later, in April of the same year, Schubert's observations with the barometer gave the depression at about 600 (598·5) Paris feet.†

In the following year, 1838, two barometrical measurements were taken. That of Bertou, a French traveller, gave to the sea a depression of 406 metres, or 1332 feet English.‡ The other, by Russegger, a German, indicated 1319 Paris feet, equal to 1400 feet English.§

The results of similar barometrical measurements for the level of the lakes of Tiberias and the Hûleh, by Schubert and Bertou, exhibited a still greater diversity. The former made the depression of the first lake to be 535 Paris feet, only 65 feet less than his estimate of that of the Dead Sea; yet he made the Jordan at the bridge, near the Hûleh, to be 350 Paris feet *above* the Mediterranean—a difference of 880 French feet in the distance of about 5 miles! || Bertou, on the other hand, gave the depression of the Lake of Tiberias at 230·3 metres, or 756 feet English, being 577 feet less than his estimate of that of the Dead Sea; while that of the Hûleh, according to him, is about 18 feet; implying a fall of 737 feet in the same 5 miles ¶

Such was the state of the question when the 'Biblical Researches in Palestine' were published, in 1841. The preceding results were so greatly at variance as to be utterly inconsistent with each other; and seemed in some respects to be equally so

\* Journ. of R. Geog. Soc. 1837, p. 456; Ib. 1839, p. lxiv.

† Schubert's Reise, iii. p. 87. The proportion of the French foot to the English is as 16 to 15.

‡ Bulletin de la Soc. de Géog., Oct. 1839, p. 161.

§ Berghaus, Annalen, Feb. u. März, 1839, p. 432.

|| Schubert's Reise, iii. pp. 231, 259. The distance is here reckoned from the bridge to the alluvial tract below.

¶ Bulletin de la Soc. de Géog., Oct. 1839, pp. 161, 146, 145.

with the rapidity of the stream and the nature of the country. I therefore ventured in that work to suggest that "so great is the uncertainty of all such partial measurements and observations (as evinced in the like case of the Caspian Sea), that the question can never be solved with exactness until the intervening country shall have been surveyed and the relative level of the two seas trigonometrically ascertained." \* Such a measurement was afterwards understood to have been accomplished during that very year, 1841, by Lieut. Symonds, of the British Royal Engineers. A very slight notice of his results was laid before the Royal Geographical Society of London, at their meeting, January 24th, 1842.† One of the earliest accounts was published in this country in July, 1842, in the following extract of a letter from the Rev. Eli Smith to the writer, dated at Beirût, February 7th, 1842:‡—

"I am happy to inform you that the altitude [depression] of the Dead Sea has been ascertained by exact trigonometrical measurement. Lieut. Symonds, of the British Royal Engineers, surveyed the greater part of Judea and the region around the plain of Esdraelon; and, while doing it, carried a double line of altitudes from the sea at Yâfa to Neby Samivîl, and thence another double line to the Dead Sea. He found the latter to be 1337 feet below the Mediterranean. By similar observations he ascertained the Lake of Tiberias to be 84 feet below the Mediterranean. These numbers he gave me himself, and at the same time showed me his calculations." The same statement of the ascertained depression of the two lakes (1337 feet and 84 feet) was communicated by M. von Wildenbruch, the Prussian Consul-General at Beirût, to the Royal Geographical Society of Berlin, during the same year, and published by them in their Monthly Report.§

In May of the same year, 1842, the President of the Royal Geographical Society of London, William R. Hamilton, Esq., in his annual address delivered before the Society, and afterwards published in their Journal,|| entered into some details respecting the manner in which the survey had been performed, to which we shall have occasion hereafter to recur. He also stated the results at 1311·9 English feet for the depression of the Dead Sea, and 328 feet for that of the Lake of Tiberias. The same distinguished gentleman, in his annual address of the following year (1843), and also in his address on delivering one of the gold medals of the Society to Lieut. Symonds, gives

\* Bibl. Res. ii. p. 222.

† Lond. Athenæum, Jan. 29, 1842.

‡ Bibl. Repository, June, 1842; also in Biblioth. Sac., Feb. 1843, p. 16.

§ Monatsbericht der Ges. für Erdk. zu Berlin, Jahrg. iv. p. 141, Nov. 1842.

|| Journ. of the R. Geog. Soc., 1842, pp. lx. lxi.

the exact numbers at 1312·2 feet for the Dead Sea and 328·1 feet for the upper lake.\* In commenting upon this difference of level between the two lakes, he makes the following remarks, which are worthy of grave consideration:†—

“It cannot have escaped your notice that there still remains to be executed in this part of the globe a very important and interesting operation, to account for the very great discrepancy of these figures: for it follows from these two ascertained levels that there is a difference of nearly 1000 feet between the Lake of Tiberias and the Dead Sea, a distance in direct line of little more than one degree of latitude, which implies (the Jordan not being a meandering stream) a fall of more than 16 feet in every mile of its course. This is in itself a very remarkable phenomenon, and calls for the early attention of travellers and geographers. The river has been frequently crossed, and is always noted as a rapid stream; but no cataracts or decided *rapids*, as such, have been observed; and no one has traced its banks from one of these points to the other.”

It is the purpose of the present paper to draw attention to what Mr. Hamilton so justly calls “a very remarkable phenomenon;” and, by a reference to the ascertained fall of several other rivers in different parts of the globe, to present this phenomenon in its true light and proportions. The way will then be open to bring forward some considerations which may seem to connect themselves with the result.

The immediate banks of the Jordan, as is said above, have never been fully traced between the two lakes, though travellers have passed along the whole length of the valley. Bertou, in 1837, went from Tiberias to Jericho through the valley; and in 1844 the Rev. Eli Smith passed up from Jericho as far as to Wady-el-Fâri'a, N. of the mountain called Kûrn-es-Sûrtûbeh. A copy of his unpublished Journal is now in my hands. The river has been frequently crossed at various points; and, indeed, from the Lake of Tiberias as far down as to Beisân, may be regarded as well known. Irby and Mangles crossed near that lake, and again further down on the route from Om Keis to Beisân; and both they and Bertou describe the river as “winding extremely” and having little current.‡ Buckingham relates that in crossing the river 4 or 5 miles S. of the lake the water was so deep that the horses had to swim for a few minutes, the current here “winding slowly over a sandy and pebbly bed at the rate of 1½ mile an hour.”§

\* Journ. of the R. Geog. Soc., 1843, pp. xi. lxxiv.

† Ibid. p. lxxiv.

‡ Irby and Mangles, Travels, Lond. 1845, p. 91; Bulletin de la Soc. de Géog., Sept. Oct. 1839, p. 150.

§ Travels among the Arab Tribes, 4to. p. 7.

Just below Beisân is a ford, where Burckhardt crossed in July, and found the water 3 feet deep. He says the river is fordable in many places in summer; but during the rainy season, the spots where it may be forded are few.\* Irby and Mangles, crossing at the same ford on the 12th of March, remark that the water reached above the bellies of the horses; and that the current was here much swifter than in the part nearer the Lake of Tiberias.† The same travellers a fortnight later, March 29th, in passing from Es-Salt to Nâbulus, lost their way, and coming to the Jordan, were surprised to find it very much swollen. The stream was exceedingly rapid, and so deep that they were obliged to swim their horses.‡ Buckingham, crossing with Mr. Bankes some distance above Jericho early in February, found the river easily fordable; the stream was exceedingly rapid, flowing over a bed of pebbles.§ The bathing-places of the pilgrims opposite Jericho have been often described; and the river there runs with a swift strong current, but without rapids. The same is true of the crossing-place visited by my own party further down, where I have described the Jordan as having “a still though very rapid current;” so that our Egyptian servant, a stout swimmer of the Nile, was carried down several yards in crossing. The water was here said to be 10 or 12 feet deep, and the river is never passed at this point without swimming the horses.||

These notices all indicate a swift current of the river below Beisân; but still nothing in the nature of *rapids*. It must also be borne in mind, that the fording-places are always the shallowest spots, where the current of course is the swiftest. Nor do the Arabs know of any rapids; nor have they ever reported any to travellers. It is, however, barely possible that something of the kind may exist in that singular tract of the valley opposite to Kûrn-es-Sûrtûbeh. From the foot of that mountain a higher desert tract of land, or low ridge, extends across the valley; through which the Jordan finds its way in a deep ravine. Indeed, in the vicinity of the river the whole tract is broken up into a labyrinth of like ravines, with barren, chalky sides, forming a most wild and desolate scene. Burckhardt speaks of the same as “a chain of low calcareous rocky heights.”¶ This portion of the river’s course has never been minutely examined; though it is obvious that if rapids exist even here, they can have no very unusual fall.

The flow of the Jordan is swift, deep, and silent; its waters

\* Trav. in Syria, &c., p. 344.

† Trav., Lond. 1845, p. 92.

‡ Ibid. p. 99.

§ Trav. in Palest., 8vo. ii. pp. 92, 93.

|| Bibl. Res. in Palest., ii. p. 256.

¶ Rev. E. Smith, MS. Journ.; Burck., Syr., p. 347.

emit no sound—neither roar nor murmur. Below Beisân its course has few, if any, windings. The direct distance between the two lakes may be taken at one degree of latitude, or 60 geographical miles; it being actually a little less according to the best maps. The difference of level between the lakes, as ascertained by Lieut. Symonds, is 984 English feet; giving, therefore, a fall of 16·4 feet in every geographical mile.

Let us now compare the known rate of descent in some other of the most rapid streams in the different parts of the world.

I. THE ORONTES.—The elevation of the lake of Antioch above the Mediterranean, as ascertained by the English engineers during Colonel Chesney's expedition, is 365 English feet.\* This lake lies opposite the elbow of the Orontes, where that river turns S.W.; and the outlet of the lake enters the latter; so that the level of the river at the elbow differs very little, if at all, from that of the lake. The direct course of the Orontes from its elbow to the sea is about 24 geographical miles. This gives an average fall of nearly 15 feet for every mile of the course below the bend; being nearly equal to that of the Jordan. But the stream differs greatly from the Jordan in its character. Below Antioch it passes through a mountain gorge with perpendicular walls; where the river "roars over its rocky bed" in a succession of rapids and shallows, which render it unnavigable even for steam-vessels.† Further down, in the plain towards the sea, the river is in some places fordable, but is usually crossed by a ferry, and the current is very rapid.‡

In the following notices of the Elbe, the Danube, and the Rhine, the measurements are taken from Stein's Geography, a popular German work of high authority.§

II. THE ELBE.—The elevation of this stream at its junction with the Moldau, near Melnik, in Bohemia, is 426 German feet; || at Schandau, in the Saxon Switzerland, 320 feet; at Wittenberg, 204 feet. From Melnik to Schandau the distance is about 45 geographical miles, but the river varies considerably from a direct course; from Schandau to Wittenberg the course is more direct, and is about 95 geographical miles. Hence, according to these data, above Schandau, where the

\* Journ. R. Geog. Soc., 1838, p. 416.

† Irby and Mangles, p. 70; Bowring's Report on Syria, p. 49; W. M. Thompson, in *Miss. Herald*, 1841, p. 235.

‡ W. M. Thompson, *Ibid.*

§ C. G. D. Stein's *Handbuch der Geographie*; herausgeg. von F. Hörschelmann, 3 Bde. 8vo., Leipz. 1833–34, sixth edition.

|| The proportion of the German (Rhenish) foot to the English is as 139·1 to 135, or nearly as 15·5 to 15.

river breaks through the Erz mountains, the average fall in each direct geographical mile is  $\frac{106}{45} = 2.3$  feet; and below Schandau, where the river is still for some distance among the mountains, only  $\frac{116}{95} = 1.2$  feet. Yet the Elbe is justly regarded as a very rapid stream.

III. THE DANUBE.—It is necessary here to include only that portion of the river which flows among mountains, and is the most rapid, viz. between Passau and Vienna. The elevation of the stream at Passau is 786 German feet; at Vienna 480 feet. The direct distance is nearly 130 geographical miles. The average descent, therefore, in each mile is  $\frac{306}{130} = 2.3$  feet. Yet this tract comprises the celebrated *Strudel* and other rapids, formerly so much dreaded by the boatmen. Indeed, until the introduction of steam navigation, the boats which descended the Danube were very rarely, if ever, taken back; but were broken up at the end of their voyage.

IV. THE RHINE.—This noble river we may look at in three different sections.

1. *Between Cologne and Mayence.*—Here we find the celebrated scenery of the Rhine. The river flows between mountains, and is a bold and rapid stream. The elevation at Mayence is 256 German feet; at Cologne 112 feet; the distance between the two places nearly 90 geographical miles. The average fall, therefore, is  $\frac{144}{90} = 1.6$  feet in each mile. Yet in this tract is the rapid at the Lurlei, the Binge-Loch, and others; and so powerful is the current, that the steamers which descend from Mayence to Cologne in a day, for a long time took two days to return. Indeed, so late as 1827, the time of a steamer from Rotterdam to Strasburg was eight days; while the downward trip was made in forty hours.

2. *Between Mayence and Basel.*—Here the Rhine pours its waters rapidly with very many windings through the immense plain. Its elevation at Basel is 755 German feet; at Mayence, as before, 256 feet; and the direct distance between the two cities about 158 geographical miles. This gives the average descent of  $\frac{499}{158} = 3.1$  feet a mile; nearly double that of the straighter and more navigable portion below. The very winding course of the river, however, serves greatly to diminish the rapidity of the current.

3. *Between Basel and the Lake of Constance.*—At Stein, situated at the foot of the lake, the elevation is 1200 German feet; at Basel, 755 feet; the direct distance between is about 56 geographical miles. The average fall is, therefore, 8 feet in each mile of direct distance. But this section of the Rhine is the most rapid in the whole course of that river, after it loses its character of a mountain torrent in the Lake of Constance.

Besides the strong rapid at Laufenburg, it includes the celebrated fall of Schaffhausen, from 75 to 80 feet in height. If these be deducted, the average fall is reduced to 6 feet in the mile. This portion of the river is not navigated except by produce boats; and these are only pushed or towed up the current by main strength.

V. THE MOHAWK.—If it should be said of the preceding streams, that the measurements depend merely on the barometer, and are therefore of doubtful accuracy; yet in the present instance such an objection cannot be taken. The great Erie Canal runs all the way along the bank of the Mohawk; and the measurements are the results of actual levellings and surveys in laying out that great work. The elevation of the river at Rome, above tide-water in the Hudson, was found to be 419 English feet.\* The direct distance from Rome, along the valley of the Hudson, is not less than 95 geographical miles. This gives the average fall in each mile at  $\frac{419}{95} = 4.4$  feet. The Mohawk is everywhere full of ripples and rapids; and probably every one who has seen the two rivers would regard it as a more rapid stream than the Jordan. The above measurement comprises also the falls of the Cohoes, having a descent of 70 feet; and the Little Falls, where the water descends 42 feet in half a mile. Deducting these, the average fall of the river is reduced to 3.4 feet in the mile.

VI. THE MISSOURI.—At the Great Falls of the Missouri, 2500 miles above its junction with the Mississippi, it is stated that the river descends 357 feet in 18 miles by a succession of falls; the greatest fall being 87 feet perpendicular, and the next 47 feet.† This would give the average descent in each mile not quite 20 feet.

#### RECAPITULATION.

|  | Fall per Mile. |
|--|----------------|
| THE JORDAN, without rapids and usually deep . . . . .              | 16.4 feet.     |
| THE ORONTES, "roaring over its rocky bed," with shallows . . . . . | 15. "          |
| THE ELBE, above Schandau . . . . .                                 | 2.3 "          |
| " from Schandau to Wittenberg . . . . .                            | 1.2 "          |
| THE DANUBE, above Vienna, with rapids . . . . .                    | 2.3 "          |
| THE RHINE, lower section, with rapids . . . . .                    | 1.6 "          |
| " middle section . . . . .   | 3.1 "          |
| " upper section, with falls . . . . .                              | 8. "           |
| THE MOHAWK, with many rapids and falls . . . . .                   | 4.4 "          |
| THE MISSOURI, at the Great Falls . . . . .                         | 20. "          |

Thus it appears that of all these streams the only ones, which

\* N. Y. Canals: Laws and Documents, vol. i, p. 268. Albany, 1825.

† Haskell and Smith's Gazetteer, p. 416.

can be compared with the Jordan in rapidity of descent, are the Great Falls of the Missouri, and the lower part of the Orontes, which flows over rocks and is unnavigable. The Rhine, in its most rapid portion, and including the fall of Schaffhausen, has but one-half the average descent of the Jordan. The Mohawk, with its many rapids and falls, has but one-fourth part of the same descent. The Jordan, so far as known, has neither cataracts nor rapids; and its flow, though swift, is silent. Yet in the 984 feet of its descent in 60 geographical miles, *there is room for THREE CATARACTS, each equal in height to NIAGARA*, and still to leave to the river an average fall equal to the swiftest portion of the Rhine, including the cataract of Schaffhausen!

All this sufficiently attests that the descent of the Jordan, so far as ascertained, does indeed present, in the language of Mr. Hamilton, "in itself a very remarkable phenomenon." And it is hardly to the credit of the scholars and learned societies of Western Europe, to whom the Holy Land is now brought within an easy journey of a few days, that more than four years should already have been suffered to elapse since attention was thus publicly called to this important problem, without the slightest effort having been made, so far as the public are informed, to arrive at its solution.

In the absence, therefore, of all further observations, and in view of the striking anomaly thus presented by the Jordan as respects all other like rapid streams, I venture to suggest—not, certainly, in a spirit of doubt or want of confidence in the distinguished engineer, but solely in behalf of the interests of science—whether, after all, there may not be a possibility that some slight element of defect or inaccuracy may have entered into the observations or calculations, and thus have affected the correctness of the result? The question would seem to be a fair one here, between the possibility of some such error on the one side, and the probability of so immense a contrast with all similar physical phenomena, so far as known, on the other.

The following account of the manner in which the observations were made is given by the President of the Royal Geographical Society, in his annual address for 1842, and is the only one I have yet seen.\* Lieut. Symonds, being furnished with an excellent seven-inch theodolite, "measured a base from the Martyrs' Tower near Ramleh, on the plain of Jaffa, on which he founded his triangulation for the south portion of his district; and, finding the instrument sufficiently nicely divided

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\* Journal of the Royal Geog. Society, 1842, p. lx.

in its vertical arc, he was enabled to ascertain the relative levels of his various points with great accuracy. He then worked with his triangulation towards the head of the Dead Sea, taking at every station a very accurate series of vertical angles, the mean of which he worked on, making the necessary allowances for refraction and curvature; but, owing to the want of another instrument, and a competent person to take simultaneous observations, he could not ascertain what the former was, and had to assume it at  $\frac{1}{15}$  of the subtended angle from the earth's centre, which he considers to be very near the truth. Lieut. Symonds completed the levels in this manner by two different lines from Jaffa to Nebi Samuel, the highest point of the Jerusalem range, the one checking the other, and found the difference but trifling. From thence he started on the same plan to the Dead Sea, and with nearly as good success, the two levels differing from 11 to 12 feet. Owing to the unfavourable nature of the ground about Jerusalem, and the cliffs overhanging the plains of Jericho, Lieut. Symonds could not carry the two lines of level, independently of each other, to the required spot, which might have been done in spite of the natural difficulties, had he had better assistance than he could procure from Bedouins. The work occupied him nearly ten weeks, though the distance traversed was not more than 47 miles, the direct distance from Jaffa to the Dead Sea."

It appears from this statement that the observations consisted in a double series of vertical angles, connected apparently (at least sometimes) with long distances. The survey, therefore, was not carried on by the process of levelling usually employed in laying out the course of a canal or railroad. However exact, therefore, the observations may have been in themselves, yet no one probably will suppose that this method of survey would ever be adopted, or in any way relied on, in undertaking any great public work, like a railroad or canal, where the ascertaining of the true level was essential.

It appears, also, that the refraction could not be determined, but was assumed hypothetically at a certain amount in the calculations. The atmosphere in Palestine is dry and singularly transparent, so that objects situated at a great distance appear as if comparatively near at hand. It would seem not unnatural that this should have an effect upon the amount of refraction, and cause it to be different from that which exists in the more humid atmospheres of England and other countries; and this difference it might require a series of careful observations to determine accurately. Especially would it seem important to take into account the peculiar degree of refraction

near the Dead Sea and along the Jordan valley, where, from the greater depression of the surface, the atmosphere must naturally be much more dense than in any other known portion of the globe.

It would seem, further, that there existed an important discrepancy between the results of the earliest calculations and those subsequently published. In the statements reported from Beirût to this country by the Rev. Eli Smith, and to Berlin by M. von Wildenbruch, the Prussian Consul-General, and derived from Lieut. Symonds himself, the depression of the Lake of Tiberias is given at only 84 feet; while the later publication makes it 328 feet—a difference of 244 feet. This would give for the difference of the two lakes 1228 feet, and would raise the average fall of the Jordan in each mile to 20 feet. How this difference arose we are not informed; it may have been by varying some one or more of the assumed elements in the calculation.

There is another circumstance which, perhaps, is hardly of sufficient importance to be adduced here, and yet, under a certain aspect, it is not without some weight. There exists a plan of Jerusalem, published by John Weale, London, 1844, and marked as “Surveyed by Lieuts. Aldrich and Symonds, Royal Engineers.” This plan differs from every other in the form and extent of the Haram area, the site of the ancient Jewish temple. The eastern side of that area, according to the independent measurement of Mr. Catherwood, of Messrs. Tipping and Wolcott, and of the Rev. Eli Smith, in 1844, is 1525 feet in length; the plan in question gives it at 1400 feet. The southern side of the same area, according to the measurements of the same gentlemen, is not less than 912 feet; while it is laid down on this plan at only 830 feet; the northern end being given at about 1060 feet. Above all, the western side of the area, instead of being marked as a straight line, as is done correctly in every plan of Jerusalem from D’Anville to Schultz, is here represented as being drawn in towards the southern end by two rectangular offsets, one of 100 feet, and the other of 130 feet. That no such offsets exist is matter of public notoriety to all who have ever visited Jerusalem; and it is difficult to understand how such a representation can ever have come to be connected with the names of scientific engineers. No doubt the matter can be, and perhaps has already been, satisfactorily explained; otherwise it is easy to perceive that it might have some bearing upon a judgment of the present question.

Taking into consideration all the circumstances thus far adduced, there certainly does seem ground sufficient for the

suggestion of a doubt, whether the problem of the depression of the Dead Sea and Jordan valley is yet fully solved. Or if a re-examination should confirm the accuracy of the former results, there still remains the "remarkable phenomenon" of the great descent of the Jordan to be investigated and explained. Either of these objects alone would be worthy the attention of European governments; combined as they are, they ought not to remain uninvestigated another year. It would be a small thing for England, or France, or Prussia, to send out an expedition for this purpose; and it may be hoped that the Geographical Societies, which adorn the capitals of those countries, will not let the matter rest until it shall be fully accomplished.

The survey ought to be conducted in the same method and with all the caution and accuracy usually required in laying out the route of a canal or railway. It might be carried across the mountain from Jaffa by Jerusalem to the north end of the Dead Sea; or, perhaps, better from Gaza by way of Beer-sheba to the Dead Sea, either opposite the long peninsula or further south. This latter course would avoid the mountains, except the descent to the Dead Sea itself. The survey ought likewise to take in the course of the Jordan between the two lakes; as also the tract between the Lake of Tiberias and the Mediterranean near Haifa. These three different routes would mutually check and prove each other.

In the same connection, it would be exceedingly desirable to extend the survey to the upper sources of the Jordan above Hasbeiya, and to include also the valley of the Būkâ'a between Lebanon and Anti-Lebanon, connecting it with the Mediterranean on the north of Lebanon, and perhaps also near Tyre, along the course of the river Lîtâny. There is here a remarkable configuration of the earth's surface, respecting which we have as yet no accurate knowledge.

There is here at least one interesting problem yet to be solved in determining the elevation of the Būkâ'a above the sea. From barometrical measurements taken at Ba'albek, this elevation is given by Schubert at 3572 Paris feet; by Russegger at 3496 Paris feet—equivalent in English feet to 3810 and 3729 feet respectively.\* Near Ba'albek rises the Lîtâny, which flows south and west to the Mediterranean near Tyre. Just north of Ba'albek is the low watershed in the valley, beyond which are the sources of the Orontes, which runs north to the parallel of Antioch, and then bends round south-westwards to the sea. We have already seen that the

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\* Schubert's *Reise*, iii. p. 322; Russegger's *Reise*, i. p. 702.

average fall of this stream below its elbow is 15 feet in the geographical mile. The elevation of its remotest source, near Lebweh, cannot vary much from that of Ba'albek, or 3729 English feet, taking the estimate of Russegger; while we have already seen the elevation at the elbow to be 365 feet. The difference gives the fall of the river between those points at 3364 feet, in the direct distance of nearly 128 geographical miles. This is equal to an average fall of 26.4 feet in each mile, or nearly double the rate of fall in the same river (15 feet) below its elbow. This result is quite incompatible with the greater comparative rapidity of the Orontes in its lower portion, and also with the general features of the country and the extensive marshes along its upper valley. The barometrical measurement of the Būkâ'a is therefore probably too high.

The same inference is confirmed by comparing the course of the Litâny. From Ba'albek to the sea its direct course is nearly 55 geographical miles. It flows at first along the alluvial valley; then breaks through the southern spurs of Lebanon by a deep chasm for about 20 miles, much of the way over a rocky bed, and with a rushing and foaming stream; and at last flows to the sea with many windings through a broad low tract of meadow land. If, now, for this 20 miles of chasm we assume an average fall in the mile of 100 feet, or 2000 feet in all (which is a very large allowance—greater, indeed, than the rate of descent at the Little Falls of the Mohawk), there yet remains of the elevation at Ba'albek (3729 English feet) no less than 1729 feet to be distributed along the rest of the course, or 35 geographical miles. This gives an average fall of very nearly 50 feet in a mile, in a course mostly along alluvial valleys. This result, therefore, goes strongly to confirm that found above in the case of the Orontes; and both together would seem to afford decisive proof that the reported elevation of the Būkâ'a must be greatly exaggerated.

Let us hope that public attention may be called to the various points referred to in this paper, and that they, who have it in their power, will speedily cause these questions to be put at rest for ever.

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IX.—*On the Fall of the Jordan, and of the Principal Rivers in the United Kingdom.* By AUGUSTUS PETERMANN, F.R.G.S.

[Read Feb. 28, 1848.]

THE depression of the Dead Sea and of the Valley of the Jordan has, ever since its discovery in 1837, excited the interest of the Royal Geographical Society of London; and recently its attention has been further invited to the subject by a very important communication from Professor Robinson of New York. In it he draws especial notice to the fall of the Jordan, which he calculates from various measurements to be at the rate of 16·4 feet per geographical mile (= 14·3 per statute mile); and he appears to regard such a fall as being "very remarkable," owing to the circumstance that no cataracts or decided rapids have hitherto been discovered to account for it. He considers such a fall without cataracts as an "unusual" phenomenon, owing to his observation of the fact that several rivers which he enumerates differ very materially from the Jordan in that respect.

In this paper it is intended to lay before the Society a few remarks on the depression of the Dead Sea and on the fall of various rivers in Great Britain, and to illustrate by well-known examples, that even if it be admitted that the Jordan falls without cataracts at the rate of 14·3 feet per mile, there is nothing very remarkable in such a fall.

The depression of the Dead Sea and Jordan valley, after repeated attempts to ascertain it by barometrical measurements since 1838, was in 1841 measured by Lieut. Symonds by trigonometrical operations, the results of which, generally speaking, are much more to be relied on than barometrical observations; yet the discrepancies between the results of the trigonometrical and the repeated barometrical measurements have called forth from different quarters the desire that the trigonometrical results should be finally re-examined by that method which, so far as regards accuracy, has the preference over both barometrical and trigonometrical measurements—namely, a series of levellings to be carried from the level of the Mediterranean to the basin of the Dead Sea.

Professor Robinson suggests two reasons for the possibility that the results of Lieut. Symonds' trigonometrical measurements cannot be considered as fully solving the problem of the depression of the Dead Sea and Jordan valley—

1st. The discrepancy of the trigonometrical and barometrical results.

2ndly. The anomaly of the descent of the Jordan, according to the trigonometrical results, when compared with the fall of other streams.

For the investigation of the first point, it will be of importance to examine all the barometrical measurements of the Dead Sea and the Lake of Tiberias, which have been made up to this time.

Professor Robinson has taken no notice whatever of the measurements of the Prussian Consul-General Herr von Wildenbruch, which were communicated to the Royal-Geographical Society of Berlin in 1846, and which may claim the first place in point of accuracy amongst all barometrical measurements hitherto made, owing to the circumstance that they were checked by the simultaneous observations of a second barometer at the level of the Mediterranean.\*

|               |                          | Dead Sea.<br>(Original meas.) |         | L. of Tiberias.<br>(Original meas.) |         | Dead Sea. | L. of Tiberias. | Difference between the two Lakes. |
|---------------|--------------------------|-------------------------------|---------|-------------------------------------|---------|-----------|-----------------|-----------------------------------|
|               |                          | Fr. met                       | Fr. ft. | Fr. met.                            | Fr. ft. | Eng. ft.  | Eng. ft.        | Eng. ft.                          |
| March 1838    | } De Bertou † (Barom.)   | 419·0                         | ..      | 230·3                               | ..      | 1374·7‡   | 755·6           | 619·1                             |
| May 1839      |                          |                               |         |                                     |         |           |                 |                                   |
| November 1838 | } Russegger (Barom.)     | ..                            | 1341·0§ | ..                                  | 625·0   | 1429·2    | 666·1           | 763·1                             |
| December 1838 |                          |                               |         |                                     |         |           |                 |                                   |
| 1845          | Von Wildenbruch (Barom.) | ..                            | 1351·6  | ..                                  | 793·3   | 1446·3    | 845·5           | 600·8                             |
| Mean =        |                          |                               |         |                                     |         | 1416·7    | 755·7           | 661·0                             |
| 1841          | Symonds (Trigonom.)      | ..                            | ..      | ..                                  | ..      | 1312·2    | 328·1           | 984·1                             |

However great may be the discrepancies in the preceding figures, they exhibit some analogous features which are of con-

\* These observations were made by the Marquis de St. Simon, commander of the French ship of war Alcibiade, and both barometers were accurately compared. (They were made, as it appears, on board the vessel.) See Monatsberichte der Gesellschaft für Erdkunde zu Berlin, Jahrgang 1845 to 1846.

† The merit of the first actual measurement of the level of the Dead Sea is due to the Comte de Bertou. Schubert was the first who took a barometer to the Holy Land, but he failed in ascertaining the depression of the Dead Sea; owing to the inefficiency of his barometer, he could only make an estimate, the result of which, about 600 French feet, or 639·5 English feet, as compared with his measurement of the Lake of Tiberias, 570·2 English feet, makes a difference between the two lakes of only about 70 feet, which, as it is so very much at variance with all other measurements, cannot be taken into account.

‡ The measurement of De Bertou, as given by Robinson at 406 metres (= 1332 English feet), is only the result of a first calculation; the *ultimate* result, drawn from all his observations, both in March, 1838, and May, 1839, gives 419·0 metres (= 1374·7 English feet). See Bull. Soc. Géogr., xii., 1839, p. 166.

§ This is stated by Prof. Robinson as 1319 French feet. See Reisen, &c., 1835-1841, von J. Russegger, iii. p. 184.

siderable importance. When we compare the three barometrical results apart from Lieut. Symonds, we perceive a discrepancy, taking maximum and minimum, for the depression of the Dead Sea of 71·6 feet; and for that of the Lake of Tiberias of 179·4 feet.

These discrepancies in barometrical measurements, executed by three different parties, at different times, with different instruments, and in general under different circumstances, are not great; and in the absence of a more accurate method of measurement, one would never have hesitated to consider the mean of the three measurements as a pretty fair approximation to the truth: for the Dead Sea this mean is 1416·7 feet, and for the Lake of Tiberias = 755·7 feet; the trigonometrical results are 1312·2 and 328·1 feet.

The discrepancy for the Dead Sea will be 104·6 feet. This is not altogether unsatisfactory, and does by no means justify a doubt in the accuracy of the trigonometrical operations; there is unquestionably also much weight in Lieut. Symonds' having decidedly expressed himself as certain of the accuracy of his trigonometrical observations, the different parts of which he found agreeing with each other.\*

The more unaccountable is the very great difference we observe between his results and those of the three barometrical observations for the depression of the Lake of Tiberias: it is 427·6 feet—*i. e.* more than four times greater than that for the Dead Sea. Symonds' operations for the Lake of Tiberias were quite independent of those for the Dead Sea; but his account of them is far less complete than for those of the latter, nor does he express his opinion about the result, as he did for that of the Dead Sea. And what is of still greater importance, there is a very considerable discrepancy between his first and subsequent calculations—the first giving only 84 feet, and the latter 328·1 feet, below the Mediterranean. On the other hand, the barometrical measurements of the Lake of Tiberias and those of the Dead Sea were not independent of each other, and were made successively at short intervals.

The results for the level of the Lake of Tiberias should therefore be considered in the same degree approximately correct as those for the Dead Sea. And on this ground the great variance of 427·6 feet between the results of Symonds and those of De Bertou, Russegger, and Von Wildenbruch, can scarcely be attributed to a *threefold error* on the part of the three last-named observers.

On this consideration I conclude that there seems to be as

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\* Journ. of R. Geog. Soc. 1843, p. lxi.

little ground to doubt the accuracy of Lieut. Symonds' result regarding the depression of the Dead Sea on the one hand, as on the other we have reason to suspect the correctness of his observations on the Lake of Tiberias.

Should my suggestion prove to be correct, and the level of the Lake of Tiberias be ascertained to accord more with the barometrical measurements, the descent of the Jordan will then be reduced one-third.

But previously to submitting a few remarks on the descent of the Jordan, I cannot forbear noticing an idea, which, however vague and hypothetical it may appear, might yet be a hint for future investigations, and which at any rate cannot be misplaced here, were it only to claim more of impartiality for the important labours of Lieut. Symonds. In examining the results of De Bertou, Russegger, and Von Wildenbruch, it is curious to observe, that the depression both of the Dead Sea and of the Lake of Tiberias increases in a chronological order, with the only exception of Russegger's 666·1 feet for the Lake of Tiberias.

Schubert's measurement of the Lake of Tiberias, a year previous to those enumerated in the foregoing table, confirms also that progress of increase; and likewise De Bertou's observations in 1838 give a greater figure than his first in 1837.

The degree of the increase within a period of seven or eight years, from Schubert and De Bertou to Von Wildenbruch, amounts to 71·7 feet for the Dead Sea, and 275·3 feet for the Lake of Tiberias.

To make this rate of increase the basis of a speculation on the gradual sinking of the basin of the Dead Sea, is at present out of the question; the observations we possess are too scanty. Although the phenomenon of the sinking and rising of land is a well-established fact, no one would ever suppose that so great a rate of sinking as from 71·7 feet to 275·3 feet could have passed unnoticed by the inhabitants and travellers in such a country where it occurs, but that there may be a continual change going on in the level of that basin, similar to that in the Scandinavian peninsula (or, if we take a more analogous instance, that of the Aralo-Caspian basin\*)—no one would doubt, especially since it is well proved that the whole Jordan valley with its lakes not only have been, but still are, subject to volcanic action. "The bituminous and sulphureous sources of the Dead Sea," says Volney, "the lava, the pumice-stones thrown upon its banks, and the hot-baths of Tiberias, demonstrate

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\* Humboldt's *Central Asien*, Bd. I. pp. 522, seq.

that the seat of a subterraneous fire is not yet extinguished. Clouds of smoke are often discovered to rise from the lake, and new crevices to be formed on its shore." And Russegger observes that the mountains between Jerusalem and the Jordan, in the valley of the Jordan itself, and those around the Dead Sea, bear unequivocal evidence of volcanic agency, such as disruptions, upheaving, faults, &c. &c. ; proofs of which agency are still notorious in the continual earthquakes, hot-springs, and formations of asphalt.

Should the result of a measurement by levellings show only a slight difference from that of Lieut. Symonds, and favour the supposition of a sinking still taking place, the question would arise, whether to attribute it to a defect in the trigonometrical operations or to a change in the levels.

I now proceed to an examination of the fall of rivers in general, in order to show that the descent of the Jordan, which from the Lake of Tiberias to the Dead Sea amounts, according to the trigonometrical results, to 984·1 feet, does not stand in contradiction with the general facts of the physical development of rivers.

*The fall of rivers.*—This interesting branch of physical geography presents in its comparative results such striking anomalies as perhaps have never before been anticipated. There are rivers in this country that are of the same aggregate size and descent, and the one forms in its course a series of considerable waterfalls, the heights of some of which approach nearly to 100 feet ; whilst the other, equivalent, as before mentioned, in size and fall, presents not even a single waterfall or cataract, nay, not even one decided rapid.

To ascertain the rate of fall, there are two points, the accurate knowledge of which is necessary—1st, the length of the river in question ; 2nd, its elevation.

The length of the river, that is to say, the development of its course, is greatly influenced by the extent of its windings. These windings in their true extent can only be delineated with sufficient accuracy in maps of a very large scale, such as is adapted for national maps, as the windings which rivers generally exhibit disappear in reduced maps to such a degree that a great difference is produced in the calculations.

For the purpose of forming a judgment of the rate of the decrease of a river's course by constructing different maps in decreasing scales, I made the following inquiry regarding a river which is not uncommonly meandering in its course. I here allude to a portion of the Severn, from its source to Shrewsbury, and I found the following numerical results:—

|   | Scale.           | Length.<br>Miles | Difference. |           |
|---|------------------|------------------|-------------|-----------|
|   |                  |                  | Miles.      | Pr. Cent. |
| On the Ordnance or National Map .                           | 1 mile to 1 inch | 81·8             |             |           |
| Index Map of the Ordnance Map . . . . .                     | 10 to 1          | 68·5             | 13·3        | 16·3      |
| Petermann's River Map of the British Isles . . . . .        | 25 to 1          | 62·5             | 19·3        | 23·6      |
| Useful Knowledge Society Map of the British Isles . . . . . | 42 to 1          | 58·0             | 23·8        | 29·1      |

The first, the Ordnance Map, forms the basis of the other three. By comparing the Index Map with the Ordnance Map itself, the scale of which is ten times larger, the figures show that the windings of the river in the Index Map disappear to such a degree as to give a decrease of 13·3 miles for a length of 81·8 miles, or 16·3 per cent.; and so a map on a scale 25 times smaller gives a decrease of 23·6 per cent., and a map on a scale 42 times smaller 29·1 per cent.—that is, measuring off the length of a river in a map of a scale of 42 miles to 1 inch, the results, however carefully measured, are nearly one-third too small.

Thus with regard to the Jordan, although not a meandering river, and forming almost a straight line from the Lake of Tiberias to the Dead Sea, yet the few bends and windings of the river, when taken into account, give it a length of 80 English miles,\* which is 11 miles longer than Professor Robinson's statement of 60 geographical miles. The 14·3 feet of fall per mile which he thus calculates, will be reduced by the 80 English miles, to 12·3 feet. And I have no doubt that when the course of the Jordan is thoroughly explored, it will exhibit a still greater development, and the rate of fall will be still more reduced.†

The fall of a river influences in part the velocity or force of its current, but not to such an extent as that the rate of fall can be taken as a scale for the rate of the velocity and force of the current. We call the Danube, the Rhine, and the Elbe very rapid rivers, and they only exhibit a fall of 1 and 2 feet, and very seldom 3 feet per mile; but we should not place the Tweed in the same rank of velocity, and yet it has an average fall of nearly 8 feet in its main course from the point of affluence of Biggar Water to the sea, which is a length of 80 miles, and with this fall is freely navigated by small boats, at least so far up as Peebles;‡ while a descent of only 2 feet in the Danube pre-

\* According to Robinson's Map in his *Biblical Researches*.

† The Jordan, as appears from Lieut. Molyneux's account, is extremely winding in its course; the American expedition under Capt. Lynch found that it serpentine 200 miles, and the fact confirms Mr. Petermann's argument.—ED.

‡ Fullarton's *Parliamentary Gazetteer of Scotland*, ii. p. 775.

sents the greatest obstacles to navigation. Thus the mighty Amazons falls but 12 feet in the last 700 miles of its course, or one-fifth of an inch per mile; yet, from the immense volume of its waters, the collision of its current with the tide of the Atlantic is of the most tremendous description.

It is obvious from the preceding remarks, that in comparing the rate of fall of one river with another, the size, that is the depth and width, of the rivers should be taken into account.

The Jordan in point of magnitude ranks with several rivers of Great Britain. Legh compares the Jordan to the Thames below Oxford; and it appears, in collecting all the different statements for the size of the Jordan between the two lakes, that the average breadth may be considered to be about 30 yards and the depth 8 or 9 feet.\* The Dee of Aberdeenshire ranks in size with the Jordan, although it is only the 29th of the British rivers in regard to the extent of its basin, and stands also far below the Jordan in this point of comparison; but this difference is balanced by the nature of the climate in which the two basins are situated. The basin of the Dee lies in a very humid region, as it drains a part of those mountainous districts of Scotland which give birth to so many perennial streams, whilst the basin of the Jordan lies in a region so arid that its tributaries are almost dried up during the summer season; and amongst those, which it does receive from the eastern water-slopes of Palestine Proper, there is not one perennial stream.

I conclude, from various measurements of the breadth and depth of the Dee, that it conveys as great a quantity of water (if not greater), to the German Ocean, as the Jordan to the Dead Sea. The mean annual breadth of the river Dee at Glenmuick parish is 70 yards, and the mean depth 4 feet; the portion of the river within this parish is 38 to 53 miles distant from its mouth; in other parts farther down the breadth is 80 yards and the depth 12 feet: thus the average breadth in its lower course, for a distance of about 50 miles, may be taken at 70 yards, and the depth from 4 to 12 feet;† and as the average size of the Jordan between the two lakes is only computed at 30 yards broad and 8 to 9 feet deep, the river Dee may fairly be ranked with the Jordan in point of magnitude.

The entire length of the Dee is 87·5 English miles, and its fall 4060 feet.‡ The greatest portion of this fall naturally belongs to the upper course, the limit of which and the middle

\* Kitto's Pictorial History of Palestine, vol. ii, p. clxxiv.

† New Statistical Account of Scotland, xii, pp. 776, 832, 875.

‡ Ibid. p. 648. The Dee takes its rise high up on Mount Braeriach, the top of which is 4220 feet high; the well or fountain whence the river springs is 4060 feet, according to Dr. Skene Keith.

course may be best fixed at a distance of 15·3 miles from the source; that is, at the Linn of Dee—a spot where the river has cut through opposing rocks a long narrow passage between 30 and 40 feet deep, and forms four small waterfalls, the central one about 10 or 12 feet, the others not above half that height. Below the fall the water has scooped out a series of basins, in which it rests, deep, dark, and motionless.

From the Linn of Dee to the sea, a distance of 72·2 miles, it has yet to descend 1190 feet, which makes an average fall of 16·5 feet per mile. This is about one-fourth more than the average descent of the Jordan; and yet in the whole course of the Dee below the Linn it does not present a single waterfall or decided rapid. In some places the Dee exhibits even a fall of more than 20 feet per mile, owing to the unequal distribution of fall, to which all rivers are more or less subject, but still there are *no waterfalls* or other sudden descents.

There is another river in Scotland, the fall of which, although larger, approaches nearly to that of the Jordan. This is the famous border stream, the placid Tweed. The entire length of this river is 96·4 English miles, and the total descent is 1500 feet; thus the average fall per mile would be about 16 feet: but the actual distribution of fall for the different portions of the river is thus:—

|  | County.    | Length.  | Height.   | Fall per Mile. |
|--|------------|----------|-----------|----------------|
|  |            | Engl. M. | Engl. Ft. | Feet.          |
| From the source . . . . .                                  | Peebles .  | 1,500    | ..        | ..             |
| To affluence of Biggar Water . .                           | „          | 16·5     | 605       | 54·2           |
| Altarstone . . . . .                                       | „          | 1·6      | 582       | 14·2           |
| Neidpath Castle (1 mile before Peebles). . . . .           | „          | 8·0      | 518       | 8·0            |
| Cardrona Mains . . . . .                                   | „          | 6·4      | 472       | 7·2            |
| Boundary between the Counties of Peebles and Selkirk . . } | „          | 6·3      | 400       | 11·4           |
| Affluence of Cadon Water . . .                             | Selkirk .  | 5·0      | 362       | 7·6            |
| Fairnielee Bridge . . . . .                                | „          | 1·3      | 348       | 10·8           |
| Affluence of Gala Water . . .                              | Roxburgh . | 4·4      | 301       | 10·7           |
| Affluence of Leader Water . . .                            | Berwick .  | 4·5      | 260       | 9·1            |
| Kelso Bridge . . . . .                                     | Roxburgh . | 15·4     | 110       | 9·7            |
| The Sea . . . . .  | Berwick .  | 27·0     | 0         | 4·1            |
| Total length and fall =                                    |            | 96·4     | 1,500     | ..             |

The affluence of Biggar Water is a very good limit between the upper and middle course of the Tweed; the distance from that point to the sea is 80 miles, which is nearly the same as the Jordan between the two lakes. We see from the preceding table that the fall of the Tweed within its middle and lower course approaches in many places very nearly to the supposed average fall of 12 feet in the Jordan, as near as 11·4 feet; and

in a short distance from Biggar Water to Altarstone the rate of fall reaches even 14·2 feet per mile; and yet from the affluence of Biggar Water to the sea the Tweed possesses neither waterfalls nor rapids; and small boats, such as are used in salmon-fishing, are freely navigated.

Thus, the fall of the Jordan of 12 feet per mile, even without waterfalls, does not present such a great contrast to the falls of rivers in general, as is shown by the adduced instances.

Lieutenant Symonds' measurements may therefore prove perfectly correct; and it is not at all necessary that any falls should be discovered to account for the descent of the Jordan.

But certainly there must be something to account for the striking anomaly of Professor Robinson's results and my own. The rivers which he draws up for comparison with the Jordan exhibit more or less falls, and the two rivers which I adduce here exhibit none. One might naturally suppose that this was the consequence of incorrect data on either side, upon which our results are based; but it is not so—it is the anomaly which this feature of hydrographical development exhibits; and it is only from the deficiency of study in this branch of physical geography, or rather the scarcity of data for such a study, that this anomaly has not been fully explained.

As the velocity of rivers does not altogether depend upon the rate of their descent, in like manner the average fall does not determine the formation of cataracts. It is much more the geological character of the country through which the river runs which causes those sudden descents, and countries where sudden declivities abound are chiefly of primary or transition formation. We find striking examples in every direction.

The Severn and the Shannon, for example, are much alike in magnitude. The latter descends, from Lough Allen to its mouth, a distance of 213·8 English miles, 161 feet; the Severn, from Newtown to its mouth, a distance of 210 miles, descends 465 feet. This gives an average descent per mile of 9 inches for the Shannon, and 26·6 inches for the Severn. And yet the Severn pursues its course to the sea without any rapids or falls; whilst the Shannon, with its average fall of one-third less than the Severn, forms those magnificent Rapids of Doonas, which, for grandeur and effect, rank with the most celebrated European waterfalls.

The Tweed and the Clyde exhibit a still more remarkable anomaly. Both are very much alike in point of magnitude: the extent of their basins is 1870 English square miles for the Tweed, and 1580 for the Clyde; and they are still more alike in point of their aggregate length and fall: the length of the Tweed being 96·4 miles, and its total fall 1500 feet; the

length of the Clyde 98 miles, with 1400 feet of fall. Indeed both rivers for many miles from their source flow nearly in one direction, never diverging to any great distance from each other; and so long as they continue nearly parallel, they flow almost upon the same level, and keep on a high table-land of country, as if hesitating whether to mingle their waters or to remain separate, and whether to turn their courses to the eastern or western slope. Thus they pursue their sympathetic career till near Biggar, when they terminate their upper course, and like two wanderers descending from the mountains together, and separating by cross-roads when they have reached the low country, they at last part, the one turning eastward and the other westward. At this spot the rivers are only  $6\frac{1}{2}$  miles distant from each other—are on the same level, and have the same distance to travel ere they reach the sea—yet what a difference in their descent; the Tweed pursues its course evenly and gently; while the Clyde has not parted from its former companion for a greater distance than 18 miles, before it boldly dashes over a whole series of those well-known falls, the principal of which are the Bonnington and Stonebyres Fall, and Corra Linn. The descent over all these falls is computed at 230 feet.\*

Thus the preceding examples sufficiently attest that the occurrence of cataracts and other descents in a river depends but little on its aggregate fall.

Thus there is certainly “room in the Jordan for *three cataracts*, each equal in height to Niagara,” as Professor Robinson remarks; but, on the other hand, if there should not be discovered one single rapid in it, there is still nothing of a remarkable phenomenon about it.

The different points on the subject thus adduced are recapitulated as follows:—

- 1st. Lieut. Symonds’ results for the depression of the Dead Sea, compared with the different barometrical results, do not prove such an amount of discrepancy as to justify a doubt in their accuracy.
- 2nd. The same results for the Lake of Tiberias are so much at variance with the barometrical results, that it seems probable the latter would prove nearer to the true level.
- 3rd. The fall of the Jordan of 984 feet between the two lakes, as computed from the trigonometrical results, does not exhibit an “immense contrast with all similar phenomena.” And, moreover, owing to our present defective knowledge of the entire course of the Jordan, and the anomaly of the fall of rivers in general, inferences drawn from the aggregate fall of the Jordan can scarcely prove

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\* Fullarton’s *Parliamentary Gazetteer of Scotland*, i. p. 232.

of sufficient weight to control the results of trigonometrical operations.

I now beg leave to add a few data on the fall of some rivers in this country, selecting such as might give a view of the great variety of descents

The British Isles afford a wide field for the study of hydrography, and I have no hesitation in saying that it possesses for that study such extensive and valuable materials and data as no other country can boast of; but, comparatively speaking, these materials have been drawn forward, sifted, and made applicable for the promotion of science to a very limited extent. For example, the country has been levelled in all directions, and especially along all rivers of note, for the purpose of laying out canals and railways, and yet we find little information in any work regarding general results of the comparative fall of rivers.

The levels in the following data are based upon authentic documents, and relate entirely to the surface of the river above the sea at low-water. The distances have been for the first time attempted to be ascertained with accuracy.

I. *The Shannon*.—This is the third largest river in the United Kingdom, in regard to its basin.\* As the fall of rivers in general is greatest at their sources, and decreases proportionately towards their mouths, the Shannon in its descent presents one of the rare exceptions to the general fall of rivers, as it is greater in its lower than in its upper course. Its source, the Shannon Pot, or more generally called Legnashinna, rises in the county of Cavan, between Upper Lough Macnean and Lough Allen, and is 345 feet above the sea. After a course of 11·6 miles, it enters Lough Allen, up to which it is rendered navigable, owing to the little descent from that place. The distance to which it is navigable is 213·8 miles from its mouth; and in this respect it is superior to all other British rivers—the navigation of the Severn extending only 192, and that of the Thames 193 miles from their mouths. From the head of Lough Allen to the foot of Lough Derg, a distance of 131·8 miles, it descends only 50·5 feet, or  $4\frac{1}{2}$  inches per mile. After leaving Lough Derg, the inclination of its course changes considerably, and gradually increases, till it reaches a fall of nearly 17 feet per mile between the town of Castle Connel and Castle Troy, a distance of 3·3 miles. It is in this portion where the mighty Shannon, 40 feet deep and 300 yards wide, forms the magnificent Rapids of Doonas.

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\* The two larger rivers are the Humber (including the Trent and the Ouse) and the Severn.

*The Fall of the Shannon.*

|   | County.     | Length.  | Height.   | Fall per Mile. |
|---|-------------|----------|-----------|----------------|
|   |             | Engl. M. | Engl. Ft. | Feet.          |
| From source, Legnashinna . . . .  | Cavan . .   | ..       | 345       | ..             |
| To Lough Allen, entrance . . . .  | Leitrim .   | 11·6     | 161       | 15·9           |
| Lough Allen, issue . . . . .  | „           | 7·0      | 161       | ..             |
| Carrick-on-Shannon, Bridge . . .  | „           | 11·5     | 155       | 0·5            |
| Lough Boderg and Lough Bofin, }<br>entrance. . . . .                    | „           | 12·0     | 131       | 2·0            |
| Lough Boderg and Lough Bofin, }<br>issue . . . . .                      | „           | 4·7      | 131       | ..             |
| Lough Forbes, entrance . . . . .  | Longford .  | 4·6      | 128       | 0·7            |
| Lough Forbes, issue . . . . .   | „           | 2·2      | 128       | ..             |
| Lough Ree, entrance (at the Bridge }<br>of Lanesborough) . . . . .      | „           | 10·0     | 125·5     | 0·2            |
| Lough Ree, issue (1·8 miles above }<br>the Bridge of Athlone) . . . . . | Roscommon   | 17·5     | 125·5     | ..             |
| Shannonbridge . . . . .   | „           | 16·7     | 116       | 0·6            |
| Lough Derg, entrance (1 mile S. }<br>from Portumna Bridge) . . . . .    | Tipperary . | 22·6     | 110·5     | 0·2            |
| Lough Derg, issue (1·1 mile N. }<br>from Bridge of Killaloe) . . . . .  | „           | 23·0     | 110·5     | ..             |
| Castle Connel . . . . .   | Limerick .  | 9·8      | 89·8      | 2·1            |
| Castle Troy . . . . .   | „           | 2·3      | 34·5      | 16·8           |
| Limerick, Southern Bridge . . . .                                       | „           | 6·4      | 13·5      | 3·3            |
| The Sea, between Loop and Kerry }<br>Head . . . . .                     | Clare . .   | 62·5     | 0         | 0·2            |
| Total length =  |             | 224·4    | ..        | ..             |

*The Fall of the Thames.*

|   | County.      | Length.  | Height.   | Fall per Mile. |
|---|--------------|----------|-----------|----------------|
|   |              | Engl. M. | Engl. Ft. | Feet.          |
| From the source, Thames Head (14 }<br>miles N. of Kemble) . . . . .     | Wilts . .    | ..       | 376·3     | ..             |
| To affluence of Coln (0·8 miles S.W. }<br>of Lechlade Bridge) . . . . . | Gloucester . | 22·0     | 243·1     | 6·1            |
| Tadpole Bridge, near Hampton . . .                                      | Oxford . .   | 10·5     | 219·3     | 2·3            |
| Skinner's Wear (3 mile S. from }<br>Ensham Bridge) . . . . .            | „            | 11·8     | 203·5     | 1·3            |
| Oxford, Bridge to Botley . . . . .                                      | „            | 7·8      | 190·0     | 1·7            |
| Abingdon, Bridge . . . . .  | Berks . .    | 9·2      | 168·8     | 2·3            |
| Clifton Ferry . . . . .   | „            | 6·5      | 158·0     | 1·7            |
| Affluence of Kennet at Reading . . .                                    | „            | 25·0     | 119·7     | 1·5            |
| Henley, Bridge . . . . .  | „            | 8·1      | 106·0     | 1·7            |
| Great Marlow, Bridge . . . . .  | „            | 8·0      | 94·2      | 1·5            |
| Windsor, Bridge . . . . .   | „            | 13·7     | 65·6      | 2·1            |
| Affluence of Coln, at Egham . . . .                                     | Surrey . .   | 7·5      | 52·1      | 1·8            |
| Affluence of Wey, near Wey Bridge }<br>Teddington, first lock . . . . . | „            | 7·1      | 40·8      | 1·6            |
| London, London Bridge . . . . .   | Middlesex .  | 13·2     | 21·0      | 1·5            |
| The Sea at Nore Light . . . . .   | „            | 17·6     | 4·3       | 0·9            |
|   | Kent . .     | 47·2     | 0         | 0·1            |
| Total length and fall =   |              | 215·2    | 376·3     | ..             |

II. *The Thames*.—This noble river, although the most important in Great Britain in a commercial point of view, is only the fourth in point of magnitude. The entire length of its course is 215·2 miles, which is 9 miles less than the Shannon; its descent is 376·3 feet. Unlike the Shannon, it has a more equally distributed fall throughout its course; from its head to Lechlade, a distance of 22·0 miles, its fall is 6 feet; and from thence to its mouth its average fall is only 1·2 feet per mile.\*

III. *The Tweed*.—We have already fully treated of this river in the foregoing observations; in point of area of its basin it ranks ninth amongst British rivers.

IV. *The Clyde*.—My results respecting the fall of this and the preceding river are almost entirely based upon levellings; the sources only of the two rivers are ascertained barometrically, and the portion of the Clyde comprising the falls has likewise not been ascertained by levelling instruments; however, that does not influence the accuracy of the general results, as the exact levels of the Clyde *above* and *below* the Falls check the intervening portion.

*The Fall of the Clyde.*

|   | County.   | Length.  | Height.   | Fall per Mile. |
|---|-----------|----------|-----------|----------------|
|   |           | Engl. M. | Engl. Ft. | Feet.          |
| From source . . . . .   | Lanark.   | ..       | 1,400     | ..             |
| To Clydesburn, near Little Clyde House . . . . .                          | „         | 1·8      | 999       | 222·8          |
| Bodsberryside . . . . .   | „         | 3·0      | 872       | 42·3           |
| Crawford . . . . .  | „         | 3·7      | 807       | 17·6           |
| Affluence of Duneaton Water . . . . .                                     | „         | 5·0      | 734       | 14·6           |
| Hardington Hall . . . . .   | „         | 3·7      | 686       | 13·0           |
| Wolf Clyde, Bridge near Biggar . . . . .                                  | „         | 6·0      | 632       | 9·0            |
| Eastfield . . . . .   | „         | 8·4      | 605       | 3·2            |
| Bonnington Fall, <i>above</i> the Fall (height of fall 30 feet) . . . . . | „         | 10·0     | 400       | 20·5           |
| Corra Linn (height 84 feet), <i>above</i> the Fall . . . . .              | „         | 0·7      | 365       | 7·1            |
| Stoneybys Fall (height 80 feet), <i>below</i> the Fall † . . . . .        | „         | 3·0      | 170       | 10·3 ‡         |
| Redleewood, near Daldowie House . . . . .                                 | „         | 20·2     | 46        | 7·6            |
| Glasgow, Glasgow Bridge . . . . .   | „         | (9·0)    | ?         | ?              |
| Sea at Dumbarton . . . . .  | Dumbarton | 23·5     | 0         | 1·4            |
| Total length and fall =   |           | 98·0     | 1,400     | ..             |

\* From Teddington to London Bridge it is 16 ft. 9 in. at low, and 1 ft. 6 in. at high water.

† There are two other falls of smaller dimensions, viz. the Dundaf Linn,  $\frac{1}{2}$  mile below Corra Linn, 4 feet high, and one which is  $\frac{1}{2}$  mile below Bonnington fall. The total descent of the river from the first to the last fall—a distance of 3·7 miles—amounts to 230 feet.

‡ The Falls excluded.

The accuracy of the data both for the Clyde and Tweed, which I ascertained from two lines of levellings quite independent of each other, are checked by a phenomenon which it might not be uninteresting to record in this place.

Both rivers are very nearly at the same level near Biggar. This very spot exhibits the remarkable phenomenon of a bifurcation of the two rivers—a bifurcation which differs from other larger (and more important) examples only so far as to depend upon the state of water in the Clyde. I give the words of the attentive angler who describes it: \*—"It is a singular circumstance that salmon and their fry have occasionally been taken in the upper parts of the Clyde, above its loftiest fall, which, being 80 feet in height, it is utterly impossible for fish of any kind to surmount. The fact is accounted for in this way. After passing Tinto Hill, the bed of the Clyde approaches to a level with that of the Biggar Water, which is close at hand, and discharges itself into the Tweed. On the occasion of a large flood the two streams become connected, and the Clyde actually pours a portion of its waters into one of the tributaries of the Tweed, which is accessible to and frequented by salmon."

V. *The Dee*.—We have already noticed at some length the fall of this river. The results for the Dee I have based upon levels ascertained by repeated barometrical measurements by Dr. Skene Keith and Dr. Dickie of Aberdeen, which have been kindly communicated to me by the latter. This gentleman also confirms my statements by his personal knowledge of the Dee—that it does not exhibit any cataract from its mouth up to the Linn.

*The Fall of the Dee.*

|   | County.    | Length.  | Height.   | Fall per Mile. |
|---|------------|----------|-----------|----------------|
|   |            | Engl. M. | Engl. Ft. | Feet.          |
| From source . . . . .                             | Aberdeen . | ..       | 4,060     | ..             |
| To affluence of Garchary . . . . .                | „          | 4.3      | 1,984     | 482.8          |
| Affluence of Guisachan . . . . .                  | „          | 3.0      | 1,640     | 114.7          |
| Affluence of Geauly . . . . .                     | „          | 5.0      | 1,294     | 69.2           |
| Linn of Dee . . . . .                             | „          | 3.0      | 1,190     | 34.7           |
| Ballater, Bridge . . . . .                        | „          | 26.4     | 780       | 15.6           |
| Belwade, Bridge (not in maps) . . . . .           | „          | ..       | (310)     | ..             |
| Banchory Tarnen (affluence of Feugh W.) . . . . . | Kincardine | 26.0     | 172       | 23.4           |
| Drumoak . . . . .                                 | Aberdeen . | 7.2      | 90        | 11.4           |
| Affluence of Coulter Burn . . . . .               | „          | 3.8      | 60        | 7.9            |
| Sea at Aberdeen . . . . .                         | „          | 8.8      | 0         | 6.8            |
| Total length and fall =                           |            | 87.5     | 4,060     | ..             |

\* Stoddart's Angler's Companion for Scotland.

The source of the Dee, rising between Ben MacDhùì on the E. and Braeriach on the W., is 4060 feet high, and most probably it is the highest source in the United Kingdom. The highest spring on Ben Nevis is only 3602 feet, according to my barometrical measurements—that is, 766 feet below the top of the hill; another spring, on one of the highest hills of the Grampians, Ben Alder, reaches a height of 3650 feet.

*The Fall of the entire Jordan, according to Von Wildenbruch.*

|                                   | Length.  | Height.    | Fall per Mile. |
|-----------------------------------|----------|------------|----------------|
|                                   | Engl. M. | Eng. Feet. | Feet.          |
| From Tell el Kady, source? . . .  | ..       | + 537·1    | ..             |
| To Bahr el Hùleh,* entrance . . . | 9·0      | + 100·0    | 48·6           |
| "          "          issue . . . | 4·0      | ..         | ..             |
| Bridge of the Sons of Jacob . . . | 2·5      | + 89·9     | 4·0            |
| Lake of Tiberias, entrance . . .  | 8·0      | - 845·5    | 116·9          |
| "          "          issue . . . | 14·0     | ..         | ..             |
| The Dead Sea . . . . .            | 80·0     | - 1446·3   | 7·5            |
| Total length and fall =           | 117·5    | 1983·4     | ..             |

The spring of Tell-el-Kady forms in the preceding table the source of the Jordan; it is taken as such by the natives. The ancients give the name of the source to the spring which issues from the Cave of Panias; the latter is, however, only 2 miles longer than the former, which it receives 7 miles below its origin in the cave; there are several other streams to which the original fountain of the Jordan has been assigned—indeed its birth-place has been almost as much contested as that of Homer.

There is a considerable fall of the Jordan between the Lake Hùleh, or more correctly the Bridge of Jacob, and the Lake of Tiberias; viz., a fall of 116·9 feet per mile. This rate of fall, without cataracts, would certainly exhibit a "remarkable phenomenon;" but Von Wildenbruch expressly mentions that "from Jacob's Bridge the Jordan forms a *continuous* waterfall."

The above data are part of the results of laborious researches into the physical and statistical geography of the British Isles, which I hope ere long to lay before the public in a series of maps. However dry such tables may appear, they nevertheless form the only sound basis for the knowledge of physical geography; and it was only the want, or deficiency, of such

\* I computed Bahr el Hùleh to be about 10 feet higher than Jacob's Bridge; Von Wildenbruch did not measure its level, but he says that the Jordan between the two points is almost stagnant: thus a fall of 10 feet for 2·5 miles will be fully enough. The difference between Bahr el Hùleh and the Lake of Tiberias, thus implied, agree satisfactorily with other barometrical measurements.

hydrographical facts that made us until now consider the fall of the Jordan as an unusual phenomenon.

[NOTE.—The heights for the Shannon are taken from the Ordnance Maps, except those of Castle Connel and Castle Troy, which are calculated from data given in Fraser's Handbook; those for the Thames are derived from Bradshaw's Maps of Canals of the Southern and Midland Counties, and those for the Clyde are chiefly taken from Railway Plans. For the Tweed, the height of source is determined by barometrical observation (Fullarton), and the other altitudes from Railway Plans. In the accompanying diagram I have added a section to show the whole extent of the depression of the Jordan valley. It will be observed that the southern slope is much steeper than the northern, which reaches the level of the Mediterranean at a point about 1 mile below Jacob's Bridge (101 Eng. miles from the Dead Sea), while in the Wady el Arabah the same level is attained at a distance of only about 44 miles from the Dead Sea.\* Thus I compute the whole length of the depression at 190 Eng. miles—northern slope 101, Dead Sea 45, southern slope 44.]

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X.—*Expedition to the Jordan and the Dead Sea.* By Lieut. MOLYNEUX, of H.M.S. Spartan.

[Read March 27, 1848.]

AFTER a very tedious passage from Beirout, Her Majesty's ship Spartan anchored off the town of Caiffa, at the southern side of the bay of Acre, and we immediately commenced putting into execution our project of carrying the ship's dingy, or smallest boat, overland to Tiberias: from thence to take her down the river Jordan to the Dead Sea; and, after a few days spent in exploring those interesting regions, to convey her back to the ship by way of Jerusalem and Jaffa. Our objects were to examine the course of the Jordan, as well as of the valley through which it runs, and specially to measure the depth of the Dead Sea. Captain Symonds, being anxious that the above views should if possible be carried out, did everything in his power to promote and further them; and as I was equally anxious to endeavour to fulfil his wishes, I was only too glad to volunteer my services for the purpose. Having therefore secured three good volunteer seamen from the ship (Grant, Lyscomb, and Winter), and having received every assistance from my messmates, by 3 P.M. on the 20th of August, 1847, all was prepared and ready for a start. We had brought Toby from Beirout to act as a dragoon, along with his two horses, tent, and canteen, which, with provisions, arms, and other requisites, were hoisted into one of the boom-boats; and at 4 P.M. we shoved off from the ship with the dingy in tow. We made sail for Acre, at the opposite side of the bay, and 2½ hours brought us under its walls, most of which have been built anew since the bombardment in 1840. We landed all the things and pitched our tent in the sand within a few yards

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\* Petermann's Map of Lower Egypt, Sinai, and Arabia Petræa, in Dr. Beard's 'People's Dictionary of the Bible.'

of the sea. The captain had provided me with a letter from the pasha, and another for the consul at Jerusalem; and, with the promised assistance of our worthy vice-consul, I lay down in hopes of being able to make a prosperous departure in the morning. The night was lovely, and the sea-air deliciously cool.\*

*Saturday, August 21st.*—Mr. Finzi, the vice-consul, had provided us with four good camels for boat and baggage, and three horses for the men. After breakfast and the altercations and harangues which unavoidably attend all dealings with the Arabs, we succeeded in making a start at 9 A.M., mounted on two fine camels—having previously sent on the little boat, so that she got considerably ahead while we were employed in striking the tent. The road was remarkably good; for the first two hours a four-in-hand might have been comfortably driven along it. The plain through which it passed appeared well cultivated, being almost entirely covered with the stubble of Indian corn. At 11h. 25m. A.M. we turned aside a little to the right, to avoid a small insulated mound, at the foot of which there was a well of good water; and there we enjoyed the first growls of the Arabs in charge of the camels, for, as we came to a slight ascent, so they began to make a greater noise in proportion. The hindermost camel with the boat came to his knees, but recovered himself well. 12h. 40m. P.M., got through an awkward pass, and came in sight of the village Abilin, which we left to the right, and proceeded down the valley of Shefat 'Amar. At 2h. 30m., the same camel having again come to the ground and commenced roaring, we exchanged him for one of the others. The hills around us were covered, as is generally the case in Syria, with rocks and short stunted trees; but here and there strips were cultivated in the bottoms of the valleys; and here the road dwindled into a mere footpath. At 3h. 50m., descending from a low range of hills, we reached a well called Bir el-Beder, and the ruins of a khan of the same name. The soil here appeared excellent, judging from the small specimens of cultivation visible, but covered with thistles. The Nazareth road here branched off to the right, passing through the village of Sefurieh, where there appeared to be some large buildings. At 7 we reached the village of Turan, and having journeyed 10 hours almost without cessation, pitched our tent in one of the large, open threshing-floors, which appear to be the common property of the inhabitants, and are almost invariably to be met with in the neighbourhood of the villages.†

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\* 10 P.M., Therm. 72°.

† 11h. 50m. P.M., Therm. in tent 73°.

*Sunday, 22nd.*—Left our encampment at Turan at 8h. 15m. A.M., the road following the foot of the hills which bound the valley of Lubieh; the direction being about east. The sun in the early part of the day was hot, but being occasionally obscured by clouds, and tempered with a light fresh air, it was far from intolerable. At Turan, as many doves were flying about near the tent, we succeeded in bagging three of them, much to the amusement of the villagers and to the improvement of the pot. At 9h. 30m. we passed Mount Tabor, leaving it to the right, and half an hour afterwards the village of Liblieh also to the right; Mount Tabor appearing to be an insulated hill of a rounded form, something resembling an inverted basin, but of no great height. The mountains on either side of the valley of the Jordan were now visible, and the gap between them, running nearly N. and S., pointed out the direction of our future course. A portion of the land appeared to be cultivated, but the hills looked barren and arid in the extreme. Passed some very large herds of camels which were quietly grazing, the property of a Bedouin tribe in the neighbourhood.

At 11h. 30m. arrived at the top of the last ridge of hills overlooking the lake of Tiberias and the valley of the Jordan, and enjoyed a most magnificent view. Jebel Sheikh, smothered in clouds, was distinctly seen, bearing N.N.E. (by compass); before us were the blue waters of Tiberias, surrounded by fine ranges of hills; to the left the white ruins of Safed, perched on a hill; and near the northern end of the lake a gap in the mountains, with a green patch, which pointed out the spot where the Jordan discharges its waters into Tiberias, as well as the ruins of an ancient town, which stand at a short distance from its embouchure.

At 12h. 50m. a great crisis took place. We had experienced some difficulty in descending the upper part of the hills above Tiberias, but by degrees the road became so steep, that we were obliged to hold up the boat by ropes, till at length we arrived at a point beyond which the camels could not proceed, and to return was impossible; the stones, when started, rolled to the bottom; the camels began to roar; then followed the usual trembling of the legs,—the certain precursor of a fall; and, in short, to save the boat, it became necessary to cut the lashings and let her slide down on her keel to the foot of the hill. There we again harnessed the unfortunate camels, and proceeded without further mishap to Tiberias, where we arrived at 1h. 50m. P.M., and passing under the walls of the town, we pitched our tent within a few yards of

the water. Tiberias is a larger place than I had expected, and must have been tolerably well fortified.\*

*Monday, 23rd.*—At 6h. 45m. A.M. we embarked in our little boat on the lake of Tiberias, taking with us lead, lines, &c., and everything necessary for sounding, and stood across with a light breeze till we reached, as nearly as I could judge, the centre of the lake, from whence we directed our course to its northern extremity, as I was anxious to get there in time for the sun's altitude at noon.† The observation gave us 32° 49' N. for the latitude, but it was taken about 3½' to the S. of that point. It was now so broiling hot that we landed, and remained four hours under the shade of a willow-tree, to eat and to escape from the heat of the sun. At 4 we embarked with a light breeze, which carried us over to the eastern shore, sounding occasionally until we brought Tiberias to bear W., when we stood across and reached the tent at 8 o'clock, after a very hard day's work.

*Tuesday, 24th* ‡—It appears to me that the lake as marked on the maps is too small, for from Tiberias to the eastern shore cannot be less than 8 or 9 miles, and from the northern entrance of the Jordan to its exit at the southern end I consider to be about 18 miles; but the high land opposite Tiberias renders its breadth very deceiving to the eye when viewed from the shore. At a quarter before 5 we left Tiberias and rode down by the ruined walls at the side of the lake. After looking at the hot-springs, the temperature of which was about 130°, I sent on the baggage, and embarking in the dingy, ran off about E.S.E. for a couple of hours, when finding, as I expected, but 13 or 14 fathoms, stood in again, and kept along the shore near the baggage. The road, however, soon left the beach, and we therefore parted company with the beasts and baggage; but Toby rode round near the water to direct us to the entrance of the river, which we found after running about a mile under some low cliffs. It lies at the western side of the low land that runs across the valley, and bounds the lake at its southern extremity. As we rounded the point at the end of the above cliffs, we turned short to the right, steering to the N. of W. for about ten or fifteen minutes, till at length the river went away S. At 7h. 20m. we had entered the Jordan, it being then dusk, but we had a fine moon; and, fifteen minutes afterwards, we landed on the right bank, at the eastern point of a little bay formed by the enlargement of the river. On the other side of the bay, and for

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\* 12h. 25m. P.M., Therm. in tent 82°.

† 9h. 30m. A.M., Therm. in shade 92°; 12h. 30m., in shade, Therm. 103°.

‡ 6h. A.M., Therm. in tent 82°, at noon 105°, at 5h. 30m. P.M. 105°.

some distance along the shore, there was a large Arab encampment; and we began to apprehend that we were to meet with a warm reception on our first landing on the banks of the Jordan; for, as soon as Toby had pointed out the place for us to stop, he went back to look after the baggage; and, while we landed the things out of the boat, suddenly we saw the Arabs in considerable numbers running round the head of the bay which separated their encampment from ours. Unfortunately my pistols were in my holsters with the horses, so that I was obliged to take my loaded gun and go forward to meet these unwelcome visitors. By means of signs, however, we convinced them that we only wished to sleep there for the night, and by degrees they left us. I afterwards found that they belonged to a tribe which only five days ago had been fighting with, and was worsted by the Beni-Sakbers, and were therefore obliged to take refuge on this side of the river. The next morning they again assembled round our tent, but they appeared to be friendly. I counted 90 men and boys.

*Wednesday, 25th.*—At 8h. 15m. A.M. we left our encampment at Kerak, sent the boat across the bay, and rode round with our baggage through the Arab tents, in order to see it clear off. Hitherto, for the short distance we had come, the river had been upwards of 100 feet broad and 4 or 5 feet deep; but the first turning after leaving the Arabs brought us to the remains of a large ruined bridge, the arches of which having all fallen down, completely obstructed the passage. Here our difficulties commenced; and for seven hours that we travelled that day, we scarcely ever had sufficient water to swim the boat for a hundred yards together. Many of the Arabs accompanied us down the banks of the river, possibly to rejoice over, or to take advantage of, any misfortune which might attend us. We afterwards passed two or three other encampments, the people of which seemed greatly surprised, and turned out to see us get the boat along, but did not offer any molestation. In many places the river is split into a number of small streams, and consequently without much water in any of them. About an hour and a half after starting we came to a full stop, and were obliged to take everything out, and carry the boat upwards of 100 yards over rocks and through thorny bushes; and in many other places afterwards it was nearly as bad. The *Ghor*, or great valley of the Jordan, is here about 8 or 9 miles broad; and this space is anything but a flat—nothing but a continuation of bare hills, with yellow dried-up weeds, which look, when distant, like corn-stubbles. These hills, however, sink into insignificance when compared to the ranges of mountains which enclose the Ghor, and it is therefore only

by comparison that this part of the Ghor is entitled to be called a valley.

I was surprised to find a great number of weirs running across the river; but most of them appeared to be only loose walls of stones, mud, and turf, and rising 3 or 4 feet above the water. I have seen three of them within less than a hundred yards. These weirs turn the stream into small channels, which irrigate the little green patches on either side, and produce the scanty vegetation on which the Arab flocks subsist. These weirs we found very troublesome, it being necessary to pull down a part of the wall so as to make a gap for the boat to pass; and, in some places, to avoid a row, we had to build up the gap again. At about 10h. 30m. A.M., having come to one of those weirs that was higher than the rest, and made of more solid masonry, we had to launch the boat from the top, 3 or 4 feet down into the river. These things, and the men being obliged to be constantly in the water, rendered it a matter of great difficulty to keep our arms and ammunition ready at a moment's notice, as well as to preserve some kind of communication with the cattle and baggage, which were frequently obliged to diverge to a considerable distance from the river; but a capital fellow that we hired at Tiberias as a guide, assisted us greatly in overcoming all our difficulties. At 11h. 30m. Jebel Sheikh bore N.N.E. by compass, and Jebel Ajloun S.S.E. When approaching the village of Summakh we had high, steep, sandy cliffs all along the banks of the river, particularly to the left; and the baggage animals were obliged to go along the top of these cliffs, while the boat was in the ravine below. At 12 o'clock we were nearly opposite the village of Summakh, which is perched on a round sandy hill, and looking as dry and miserable as the rest of the country. At this time I had just shot a very beautiful kind of kingfisher, and most of my other barrels had been discharged at an animal we saw on the banks of the river, which the guide called a boar, but it appeared to me more like a gigantic fox, when Toby called out to me to load my pistols—and, on looking up, I saw the camels and muleteers surrounded with a cluster of spears. I was not much surprised, for I had been expecting this for some time, and, after loading, Toby and I rode up a ravine towards the party, leaving the men to get their arms ready, and to follow if I made a sign. When I arrived on the top of the cliff, I found four Bedouins mounted and drawn up in line before the camels, and the sheikh, dismounted, standing before them. I saluted him, and told Toby to ask him what he wanted. He said that we were travelling through his country, and that it was customary for all travellers to pay

him; for without payment it was impossible for us to proceed. I explained to him the object we had in coming, and showed him how we were armed; and, after a long and angry altercation, which nearly led to blows, we made the camels and mules go down the hill to a ford, and waved to the boat to come on and join us there. The Arabs rode down the hill close to us, but did not attempt actually to lay a hand on the baggage. The sheikh insisted on being paid 600 piastres; he said his country extended 2 days' journey down the valley, and that, if I would pay him, he and his men would go with us and see us safe to the country of the next sheikh. Circumstanced as we were, it was impossible for us to protect the baggage and at the same time take the boat down the river; and as the road was too bad for the camels to carry the dingy, I saw that it was necessary, if possible, to come to some terms with these people, and therefore offered the sheikh 100 piastres to convoy us through his country and to guarantee the safety of the baggage. This proposal he treated with the most perfect contempt, and our muleteers and camel-drivers refused to proceed; but the sight of our pistols frightened them into obedience, and we went down to the village, Bedouins and all. At the village, Toby having found out that our new acquaintances belonged to the strong tribe of Beni-Sakhers, and that the valley of the Jordan was full of them, I signified to the sheikh that I would give him 200 piastres, and, if that would not do, that he might take what he could get, making at the same time a proper display of our arms. After some discussion between himself and his men, they at length agreed to the terms, and we proceeded together, along with a great number of the inhabitants of the village, who had collected around us.

We had got about  $1\frac{1}{2}$  mile below the village of Abadiyeh when we saw another party of horsemen coming towards us, on which our Bedouins crossed over to the other side of the river. Soon, however, the old sheikh discovered that it was the governor of Tiberias, for whom, happily, I had the pasha's letter at hand; and, riding up, I gave it to him, followed by the Beni-Sakhers. I found that he was accompanied by a Bedouin sheikh and a few men; and, after reading the letter, he requested that I would return with him to the village of Abadiyeh, when he would give me a letter to the sheikh of the next tribe, and send also the sheikh who had arrived with himself. We repaired accordingly to a house in the village; and when his secretary had finished the letter, we departed in company with our new sheikh; the boat in the mean time having gone on in charge of the other chief.

After proceeding a short distance we came to the ruined village of El Buk'ah, where I determined to stop for the night, as we had all been hard worked throughout the day. At this place we found the ruins of two villages on each side of the river, but nothing more remaining than bare broken-down walls. We pitched our tent on the western side of the river, after hauling the boat up on the bank. Just above this place there was a small waterfall, down which we had been obliged to ease the boat. The Bedouins stuck their spears in the ground around us, and, making their halters fast, asked us for food; but, as we had none to give them, four of the party started off in different directions to procure some.

I was much interested during the night in observing the extraordinary sagacity of the Arab mares, which are indeed beautiful creatures. The old sheikh lay down to sleep with his mare tied close to him, and twice during the evening she gave him notice of the approach of footsteps, by walking round and round, and when that did not awaken him she put her head down and neighed. The first party she notified were some stray camels, and the second some of our own party returning. The Beni-Sakhers generally ride with a halter only, except when they apprehend danger; and then, the moment they take their bridles from their saddle-bow, the mares turn their heads round and open their mouths to receive the bit. I have seen this myself frequently.

*Thursday, 26th.*—The river appeared to be so difficult for some distance below where we encamped, and it injured the boat so much getting her over the rocks and stones, that I determined to try her on the camels, although they were but small; and after some difficulty we succeeded in fixing her. Mr. Smith and I rode down the right bank of the river with the mules and baggage, and the rest of the party went down the left bank with the camels. From a hill over which our road lay I had a very fine view of the whole valley, with its many Arab encampments, all made of the common coarse black camel-hair cloth. Very large herds of camels were to be seen in every direction, stalking about upon the apparently barren hills in search of food. The Jordan had split into two streams of about equal size shortly after leaving El Buk'ah; and its winding course, which was marked by luxuriant vegetation, looked like a gigantic serpent twisting down the valley. After forming an island of an oval form and about five or six miles in circumference, the two branches of the Jordan again unite immediately above an old curiously formed bridge, marked in the map as Jisr Mejamia. This bridge, which is still in such good preservation that the road passes over it, is.

of one large pointed arch in the centre, with two smaller ones on either side, and over the latter there are three or four small arches of the same shape, which go quite through the masonry. On the western bank, opposite the end of the bridge, there is a large ruined building, of a square form, and not less than 200 feet each way; it had been well built, and even now has the remains of a fine massive gateway, composed of very large stones and looking somewhat Egyptian. The walls of this quadrangle were high and loop-holed, and had several well-built towers, some of which had windows, and in the centre stood a large cistern. The sheikh told me that this building is called Khan Alessar. Having arrived at this place with the baggage, before the camels and boat, I had time to examine the building, and also the bridge, on which I found long flat steps about 10 inches in height; and the whole built of a very dark stone, abutting against the solid rock.

The camels could not cross the river with the boat; we therefore put her on the water; and afterwards found the river so much improved that we put the spars on one of the camels, and the boat again went quietly down the stream.

The country along the banks of the Jordan appeared to be very populous; and I became convinced that it would have been utterly impossible to have succeeded, circumstanced as we were, in getting the boat down in opposition to the Arabs. The ghor or valley now began to bear a much better and more fertile aspect. It appears to be composed of two different platforms; the upper one on either side projects from the foot of the hills, which form the great valley, and is tolerably level, but barren and uncultivated. It then falls away in the form of rounded sand-hills, or whitish perpendicular cliffs, varying from 150 to 200 feet in height, to the lower plain, which should more properly be called the valley of the Jordan. The river here and there washes the foot of the cliffs which enclose this smaller valley, but generally it winds in the most tortuous manner between them. In many places these cliffs are like walls, and entirely precluded the possibility of communication between the river and our cattle above. About this part of the Jordan the lower plain might be perhaps  $1\frac{1}{2}$  or 2 miles broad, and so full of the most rank and luxuriant vegetation, like a jungle, that in a few spots only can anything approach its banks. Some of the bushes and ferns are very beautiful, particularly a feathery-leaved tree (something like the cedar of Lebanon), of which there is a great quantity.

At Khan Alessar the Bedouins that we had with us were very anxious that we should take another sheikh, which, however, I positively refused; and after, as usual, great talking, they

yielded the point: soon afterwards they wanted me to pay for corn for their horses, which I again refused, and again there was a row. I had bother enough to-day to drive any reasonable person mad: almost every minute of it I was expecting that we should come to blows; but happily I had seven barrels about my person, which I took good care to let them know; for it is still the fact that throughout the country of Ishmael "every man's hand is against every man." I was obliged frequently to ride backwards and forwards between the boats and the baggage, to know the relative position of each, and to appoint places where we should meet; but happily the river became much better after passing Khan Alessar, so that the boat got on very well. Once or twice the Beni-Sakhers were afraid of the approach of the Anizees (Aenezes), with whom they are at war, and, dismounting their horses, some of them went to the top of the nearest sand-hills to look out. I found a railway-whistle, that I had taken with me, a very useful appendage to our operations, as it was heard a long way off. At about four o'clock, having now travelled about seven hours, we agreed to stop for the night; but when the tent was half-pitched the sheikh declared that he was afraid to sleep there, and a row ensued in consequence of my refusing to proceed, but it gradually subsided. I saw to-day in the jungle a large wild boar, and a small herd of gazelles, as well as great numbers of jackals; and also doves, eagles, and vultures innumerable; but I had too many other things to do to trouble myself about them, and indeed I was afraid to discharge my barrels. The two sheikhs went away about six o'clock with the letter from the governor of Tiberias to find the sheikh who is to go on with us; and about two hours afterwards the two who remained with us rushed into the tent, saying that some other Bedouins were coming, and we all had to turn out with our arms. We mustered altogether twenty-two barrels; and our ammunition being laid out already in the tent, we should have been able to keep up a good fire, as we were encamped on a nice shingle-bank, about 80 yards long and 30 wide, with the river on one side and the thick bush on the other. It proved to be a false alarm, as only two horsemen issued from the bush into the moonlight, and they were quickly recognised to be two of the party who had gone in search of the other sheikh. It would be quite impossible to give any account of the various turnings of the Jordan in its way from the Lake of Tiberias to the Dead Sea; it was well and quaintly described in a newspaper I saw the other day as "the crookedest river wot is." \*

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\* 10 P.M., thermometer in tent 92°.

*Friday, 27th.*—Our two sheikhs returned last night, and said that the sheikh of the Ameers, who is to go on with us, would arrive in the morning. We had great trouble with our Bedouins this day. After paying the Beni-Sakhers, who had accompanied us from Abadiyeh, which was a very noisy and vexatious operation, we were left with the brother of the sheikh of the tribe; and no sooner was the boat out of sight than he began to talk about payment, and even asked 25*l.* to accompany us to Jericho, where at first they said they would go. We found out, however, that their tribe extends no farther than Abou Obeidah, near the river Zerka, and that they dare not go beyond that place. After the usual altercations, we agreed to give them three dollars for to-day, and to arrange at our resting-place about the rest. The place at which we had bivouacked the Arabs call Attah, and there the lower valley, through which the river more immediately runs, breaks out into a magnificent plain, extending from the foot of the hills on either side across the Ghor, but with a high step on the western side, where the large Arab village of Beisán stands. On setting out we were soon obliged to mount to the top of the high western ridge, and passed that village at some distance about 9h. 30m. The country here appeared very different from that which we had passed since leaving the Lake Tiberias. The higher ground abreast of Beisán, and as far as I could see to the southward, is fertile, well-watered, and cultivated, chiefly with Indian corn. It is also thickly inhabited; for hundreds of small sheds might be seen studded on the plain with men watching the crops and slinging stones to keep off the birds. I think the view from this point over the valley of the Jordan was one of the finest things I had seen—an abundant vegetation extending up the slopes of the eastern hills, which are crowned with trees up to the summit, and everything growing in the wildest luxuriance; while on the western side the higher steppe breaks down into steep sand-hills or whitish perpendicular cliffs, with only here and there the means of ascent. The river, as usual, winds very much, with banks about 20 feet in height, of brown clayey soil, somewhat resembling those of the Thames, and for some distance, on either side a thick and almost impenetrable jungle.

We made but a short journey to-day, as it was necessary to send back to Beisán to get barley for the horses, and also food for the Arabs; and we therefore pitched our tent on the small island of El Kerma, on the western side of the river, being a safe position; for I did not half like the look of the people. While riding I killed two doves at one shot from the back of

my horse, which had a good effect on the Arabs.\* At about two o'clock the head sheikh arrived; and in his presence, after the customary abominable row, we agreed to give four men 40 piastres each to take us to Abou Obeidah in two days, and to the arbitrator (rather a fine fellow) a dollar as his share of the booty. Soon after his departure our escort began to be troublesome, and the sheikh demanded 150 piastres for himself, besides what we had agreed to pay; but I told him that rather than pay it we would put the boat on the camels (which, however, was impossible), proceed as we liked, and defend ourselves. They then waxed sulky, saying they would not go at all; and at sunset they actually mounted and rode away, saying that we might get out of the scrape as best we could. We lost no time, therefore, in preparing for a serious quarrel, as it was not probable that we should get through the night without one, or reach the Dead Sea without a fight. We despatched the guide and one of the muleteers to find the other sheikh, with whom they returned in an hour, and we all sat down at the door of the tent and commenced haranguing. The old sheikh said it was not safe for us to remain where we were, and pressed us vehemently to leave the boat and the river, and go with him and the baggage to his tribe; but at last he agreed to leave one or two of his men with us, whom, in case of a row, I promised to defend. This old sheikh, Emir Nasr—a fine-looking fellow, with eyes that looked through one, and a tremendous jet-black beard—after all was settled, took his leave.

The river to-day, so far as we came, was very good for the boat; but in the upper part of it, I am within the mark when I say that there are many hundreds of places where we might have walked across, without wetting our feet, on the large rocks and stones. I never expected one-tenth of the difficulties that we had already experienced, and I was a good deal knocked up by the sun to-day, for the first time—it was, indeed, almost insufferable, but fortunately the men as yet are all well. I hoped to get down to the Dead Sea in four or five days; but it was almost like moving an army in an enemy's country—not only looking out for positions where we could not be taken by surprise, but anxiously looking out also for supplying our commissariat; for though the muddy Jordan is throughout full of small fish, yet we began to fear about our provisions, and determined to rely more on our guns for something to eat, so that we might save what we had for the Dead Sea. We succeeded, however, in getting some melons and

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\* 1 P.M., thermometer in tent 103°.

flour from Beisán to-day; but the Bedouins generally will sell nothing—indeed they appear to have but little to spare, rich as the country appears to be.

The Arabs we now have are Ameers, and differ from the Beni-Sakhers in having a quantity of black ringlets about their faces, while the latter have only a few locks on the top of the head; indeed I have scarcely seen a man since leaving Tiberias who had not jet-black whiskers, beard, and moustache.

From seeing a quantity of deposit in the plain of the Jordan to-day, and the marks of water in various places at a distance from the river, it was evident that the Jordan widely overflows its banks; and the sheikh informed me that in winter it is occasionally half an hour across; which accounts for the luxuriant vegetation in this part of the Ghor.\*

*Saturday, 28th.*—A heavy dew fell last night; and as I slept at the door of the tent, I woke up wet through; but we set off at 7 A.M. The river continued to be very good for the boat, but there was nothing like a road for the camels; so that, having sometimes to ascend the sand-hills, and at others to traverse the marshy banks of the river, we had some difficulty in getting the baggage animals along. The country during the early part of the day was very fine, well watered, and fertile: our road lay through the best part of the valley; but very soon the higher terraces on either side began to close in, and to narrow the fertile space below; the hills became irregular and only partly cultivated; and by degrees the whole Ghor resumed its original form, and quite different from the neighbourhood of Beisán. The zig-zag course of the river was prettily marked by lines of green foliage on its banks, as it veered from the cliffs on one side to those on the other.

At nine o'clock we pulled up with the baggage at an Arab encampment on the western terrace, where a great sheikh resides, of the name of Namre. We entered his tent and drank some boiled milk and coffee, surrounded by forty or fifty savage-looking Bedouins, who rode up, and sticking their spears in the ground, tied their mares to the tent-ropes. The whole plain seemed full of these horsemen, belonging to the tribe of Ameers, riding through the fields of Indian corn, spear in hand.

At 11 A.M. we rode down to the river, forded it, and pulled up on the other side to await the arrival of the boat, which was far behind in consequence of the great windings of the river, and our sheikh tried hard to oblige me to remain there

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\* 11h. 30m. P.M., thermometer in tent 83°.

for the night, but I insisted upon proceeding. His object was to keep us three days between El-Kerma and Abou Obeidah, instead of two, according to his agreement, and thereby to get more money; while I was very anxious to get down to the Dead Sea, and over this part of the business, which was one continual scene of squabble and trouble. The sun was extremely hot, but at 12h. we again started, and found some difficulty in getting along near the river, being obliged to wind about among the ravines and sand-hills, which here approach close to the river. About 1 o'clock a number of men armed with muskets came down through the bush on the opposite or western side, forded the river, and came round us. At first I did not know what to make of them; but they came up and saluted our chief by kissing his cheek, and they seemed to be a better and more industrious set of men than the Bedouins, for they cultivate the ground and attend to their flocks of sheep and goats. In consequence of their being frequently robbed by the roving bands of Bedouins, the pasha had given them permission to carry arms, and occasionally assists them in beating off those land pirates; and, seeing our escort descending the hills armed with spears, and not knowing who we were, they had turned out to defend their property. They had good countenances, and seemed to be quite a pastoral race; but where they came from I do not know, for there were no tents or houses near, and there could not have been less than a hundred of them round us while we were pitching the tent. After expressing considerable surprise at us, our arms, and our boat, they left us, peaceably re-crossed the river on the eastern side, and disappeared in the brushwood; and we finished our encampment, close to the river on the eastern side.

We killed a partridge, a duck, some doves, plovers, and curlews during our passage down the river, and I saw also a gazelle, but did not get a shot at him. There had been a few shallows in the river, and occasional obstructions to the passage of the boat from trees, &c.; but, on the whole, she was nearly able to keep up with the baggage.

I learned from our sheikh that his tribe (the Ameers) numbers about 800 men; the Beni-Sakhers 600 or 700; and the Anizees 15,000 or 16,000.\*

*Sunday, 29th.*—We started at 6 o'clock from our resting-place, which the Arabs call Fath-allah, and, after giving directions to the boat, we mounted the hills to the eastward of the river. The Jordan here runs near the foot of the western

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\* 2 P.M., thermometer in tent 106°; 8h. 30m. P.M., 102°.

mountains, which fall away in steep cliffs to the water's edge, so that the narrow plain of the river, in but very few places, attains to the breadth of half a mile of cultivated ground. The lower hills to the eastward, on the slopes of which we passed with the baggage, can be considered little more than a continuation of the high range of mountains; they are barren and uncultivated, with the exception of occasional wooded patches, and here and there some stunted shrubs or trees covered with sharp thorns. I was much annoyed to-day at being again obliged to diverge considerably from the river with the baggage, and therefore being long without seeing the boat. The water also was very bad, having many shallows and some large falls, and the ruins of a bridge took much time to pass, so that the boat was nearly six hours and a half traversing a distance by water which we walked over quietly with the baggage in three.

At 12h. 30m. the boat reached a place on the river not far from Abou Obeidah, and about one hour and a half to the north of the Wady Zerka, called by the Arabs Seguia. Here we were obliged to remain for the rest of the day, as our sheikh Nahif was afraid to go on the river, being at war, as he said, with the tribe on the opposite side. We therefore sent him by land to Abou Obeidah, to fetch the sheikh who was to go on with us. In the evening he returned, saying that the sheikh would arrive in the morning, but that he would want a good deal of money. I therefore, though with some difficulty, persuaded two Arabs of the country, who were well acquainted with the river and its neighbourhood, to go with us in the morning, and by this means I was in hopes that we should be able to get on without having anything further to do with these villainous Bedouins for the rest of the journey.\*

The cliffs on the western side are soft limestone, quite bare, and in some places they cannot be less than 300 or 400 feet high. In one spot only I observed them to be of a reddish hue. Shot doves enough to-day for dinner; and the men in the boat saw two tigers and a boar.

*Monday, 30th.*—We got away from Seguia at eight in the morning, Nahif and his men having left us at sunrise; but, to our disappointment, the two Arabs who had agreed to accompany us to Jericho hauled off this morning, on pretence that they were afraid to leave their corn; and when the sheikh to whom Nahif went yesterday came from Abou Obeidah, he brought four men with him, for whom his charge was very great. I could not prevail upon him to send one or two only

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\* Thermometer in tent from 100° to 105°.

as guides; and, as I could not afford such an expense, I resolved to try what we could do by ourselves. The guide whom we had brought from Tiberias, and who was a good man, was put in the boat along with the other man who had hitherto been assisting there, and Toby and I remained on shore to take care of the baggage. At eight we sent off the boat, and then, fording the river, we rode up on the higher ground to the westward. We had not proceeded far before we saw two Bedouins galloping down to our right, and gradually closing upon us; and, therefore, not knowing how many more might be following, we tied all the mules and camels together, got our arms ready, and when they came within hail demanded what they wanted, warning them to come no nearer, or we should fire. After making some sneering salaams they retired; but not before we perceived that one of them belonged to the five fellows whom we had in the morning dismissed from the tent, and I suppose had followed us, hoping to find the baggage unprotected. Soon after this, being on the top of the cliffs, we saw the boat below us, and waved to her to go on. At half-past nine we were abreast of the large old square castle of El-Rabua, perched upon the top of Jebel-Ajloun, where Ibrahim Pasha, when he held this country, kept an Albanian guard; but at present no one inhabits it. At Seguia the river continued to run near the western hills; and between Abou Obeidah and the cliffs which terminate the upper ground on that side, there is a considerable plain with many trees, and apparently well cultivated. This plain may extend perhaps eight or ten miles from north to south, the river Zerka bounding it on the latter side. The Jordan there again crosses the Ghor obliquely, and everything, except about its immediate banks, becomes barren and desolate. At 12h. 30m. P.M. we descended from the upper ground into the plain, through which the river runs, and which is here very remarkable, being particularly level and very green; and the contrast between it and the white cliffs which bound it on either side making it look like one large green river. A short distance above our point of *rendezvous* the river Zerka runs into the Jordan from the eastward, watering (as far as I could see) a small fertile plain similar to that through which the Jordan flows, the white chalky-looking cliffs on each side being about the same height and having the same appearance.

On our arrival on the banks of the river, about a mile below its junction with the Zerka, we saw 40 or 50 armed men, with a number of camels, lying about among the trees; they were on their way from Es Salt to Nablous with burnt weeds, which are used in making soap, and they behaved quietly enough to

us. An hour after our arrival they went on their road, and we, as usual, stuck Toby's spear in the ground, with the ensign flying on it, as a signal for the boat to bring up, intending to proceed as soon as she arrived. The last time that I had seen her was from the top of the western cliffs; she was then nearly abreast of us, and notwithstanding the windings of the river, as the water was good, and as she had four men to pull and one to steer (Grant, Lyscomb, Winter, with the guide we had brought from Tiberias, and the man we had engaged by the road), I expected her arrival in about an hour. When I found she did not appear I began to feel anxious, and dispatched one of the muleteers up the bank of the river, thinking that she might have mistaken the place of rendezvous, but he soon returned without having seen anything of her; and two other men, who were then sent, came back with no better success, although they went as far as the Zerka and to the hills above. In the mean time two Bedouin horsemen, accompanied by four men on foot, had ridden down, reconnoitred us attentively, and remained near us about an hour; and as it began to get late in the day, I made up my mind to encamp where we were for the night. I therefore looked out for a better position, out of the thoroughfare, and moved all the baggage and animals to a narrow strip of beach between the river and the bush. This being done, and still no signs of the boat, I purposed going in search of her myself; but not being able to speak the language or make inquiries, I was persuaded by Toby to remain with the baggage while he, with one of the muleteers, should ford the river and ride up the eastern bank in search of her. After most anxiously awaiting his return for an hour, he came back full gallop to inform me that he had found the boat; that she had been attacked; and that he had learnt this painful intelligence from the guide and the other Arab, who were now alone bringing her down the river. Their account to him was, that shortly after I had seen the boat from the cliffs, and waved to her to go on (and therefore about the same time that the two Bedouins had ridden up to us), 40 or 50 persons had collected on the banks on each side of the river, armed with muskets; that two-thirds of these men were blacks, belonging to the tribe of the Messallieks; that they commenced their attack by throwing stones at the boat and firing into the water close to her; and that, after they had thus terrified the men, they all waded into the river, seized upon her, and dragged her to the shore. Lyscomb, who drew a pistol, was knocked into the water by a blow of a stick; and, having got the boat on the shore, they robbed the men of all their arms and ammunition, took their hats, and let them go. They also robbed the two

Arabs of their arms, and of most of their clothes, and threatened to kill them, but let them off with a beating. This was all the intelligence he could then obtain; and, as may be supposed, I was thunderstruck by the recital of these melancholy facts. The guide and the other Arab had remained by the boat for half an hour, hoping that our men would return; but seeing nothing more of them, they concluded that they had endeavoured to follow me, and accordingly they proceeded down the river with the boat.

It was now six or seven hours since Grant, Lyscomb, and Winter had left the boat, so that had they taken the right road they must have been with us some hours back. To remain long where we were I felt would only be to wait to be attacked by overwhelming numbers; to go back would be to face the whole of this villainous tribe, and I was perfectly ignorant as to what there still might be between us and Jericho, and therefore put all the baggage on the cattle and prepared for a start. The boat arrived in half an hour; and as I could at first get no one to undertake to go on with her, we hauled her up into the bushes, hoping to return with strength enough to carry her away. But at length the two men who had brought her down offered to take her to Jericho. She was immediately launched. I gave them some bread and biscuit, and directed them, in the event of our not reaching Jericho, to proceed to Jerusalem, and to let the consul know where we had last been seen. It was dusk when the boat left us, and having disposed our arms to the best advantage, and filled my pockets with ammunition, but with a very heavy heart, I set the animals in motion, and with Toby followed them up the same road by which we had in the morning descended from the higher ground to the river. The party consisted of two camels laden with the spars and boat's gear, and driven by an old man mounted upon a donkey, and five mules laden with baggage and provisions for men and horses, three of which were intended for our comrades, should we happily find them. The man we brought from Seguia as guide (and who was the most perfect specimen of a boor I ever beheld) rode one of the mules, carrying Toby's spear. As soon as we reached the top of the cliffs we left the regular path, and turned into the bushes to avoid being seen, as we felt sure, after what had taken place, that a good look-out would be kept upon us. Here we had some doubts of the fidelity of the guide, as he twice tried to take us back into the regular road; but Toby, riding alongside of him with a drawn sword, preserved him from making further mistakes. For two or three hours in misery and distress of mind, silently and in the dark (for the moon was not yet up) we wound about the

ravines and bushes, in vain calling out the names of our lost friends, as loudly as prudence would permit. My horse fell down the side of a hill; the guides, camels, and mules tumbled by turns; every moment we expected a crowd of ruffians to rush upon us; and at one time we lost our way, and had to go round through a long 'wady' full of water and trees, but which perhaps may have helped to save us from being perceived, as it necessarily took us into very unlikely places for laden beasts to travel.

We were now nearly in the centre of the Ghor, surrounded by tribes of the greatest possible rogues, in despair of finding our poor people, and the moon just rising above the hills; and considering that it would be utterly impossible, if we remained, that Toby and I could stand against the numbers who would surround us in the morning, I resolved at once to traverse the 20 or 35 miles of country which separated us from Jericho before daylight, and from thence to dispatch the strongest guard I could collect in search of the men. Heart-rending it was indeed to adopt this course, and thus apparently to abandon our three unfortunate companions; but I could see no other possible means of helping them. Daylight would certainly have brought multitudes of savages about us, and however dearly we might have sold our lives, it is impossible that they could have lasted long.

We therefore took our course along the foot of the western mountains, and for ten long hours we kept constantly moving as fast as the camels could go, without a single stoppage, but preserving the most perfect silence throughout, always avoiding everything like huts or habitations. As we approached Jericho we broke off too much to the right, lost our way, and had partly to retrace our steps; and as we carried no water, and the night was very hot, we were nearly dead with thirst when at five o'clock we reached a small stream called Ain es-Sultan. It had once been apparently conveyed across the valley by an aqueduct, but it now runs under the arches; and having stopped there a few moments to drink, we reached the Castle of Jericho about half-past five, just as the sun shone down into the valley. Nothing but the excitement and sense of danger had preserved us from falling off our horses; and even as it was, I was obliged to walk a considerable part of the distance to enable me to keep my eyes open.

*Tuesday, 31st.*—On our arrival at Jericho I immediately went up to the old governor in the castle, produced the letter from the governor of Beirout, and by my urgent entreaties succeeded better than I ever did before with a Turk; for in a short time four soldiers well mounted and armed, and accom-

panied by the muleteer, were off in search of our lost friends. I sent by the muleteer some rum, water, and bread, and a note for Grant; and the man we had brought from Seguia as guide I desired to go up along the river-side in search of the boat, so that if we should happily find the men, we might yet be able to carry out our project.

The valley of the Jordan, from the place where we were attacked down to the neighbourhood of Jericho, needs but little description, being much the same throughout. The lower valley is about three-quarters of a mile broad; and within those bounds the river winds extremely. The cliffs on either side have still the same whitish, chalky appearance, and fall away abruptly from the upper land, which, both to the E. and W. of the river for the last 30 miles of its course, has a barren and desolate appearance, and is but little cultivated. Near Jericho the formation of the ground becomes less regular; the western mountains, in one or two places, jut out considerably into the Ghor; the cliffs less exactly mark the bounds of the lower plain; and just abreast of Jericho, near the bathing-place, the descent from the higher ground is by a number of rounded sand-hills. A large patch of green stunted trees and shrubs marks the site of what is supposed to be the ancient Jericho, and here and there are to be seen the remains of some considerable buildings, with fragments of an aqueduct at the foot of the hills to the N.W. of the modern village. Around this mud-built village there is some cultivated ground, watered by two streams, one of which flows from Elisha's fountain.

After the horses had been fed and rested, Toby and I started, accompanied by one man, from the castle, in time to reach Jerusalem before sunset, the gates being closed at that hour. About three miles from Jerusalem we met the consul, Mr. Finn, who, with a guard, was on his way to Jericho for the purpose of hearing some tidings of us; and he immediately turned round to introduce us to the Pasha. This being Ramazan, his Excellency sleeps throughout the day, eats at sunset, and after that transacts business; he was therefore still at his evening meal when we called. We had to talk a great deal before we could get anything out of him; he made several excuses—first, that the place where the affair took place was not within his jurisdiction; secondly, that the Bedouins were rebels, and that the Government was unable to do anything with them; but at last we persuaded him to write two letters, which we dictated, one to the governor of Nablous, directing him to send in search of the men throughout the country, and bring them as speedily as possible to Jerusalem or Jericho; and the other to the Pasha of Damascus, within

whose pashalik is Abou Obeidah, requesting him to take any measures in his power to recover the men and arms. He then consented to give me ten soldiers to go with me to Jericho, and to accompany me in any search that I might myself undertake. He also promised, when my search was over, to order five men to escort us from Jericho to the Dead Sea, should I still determine to embark on it. I slept at Mashallum's hotel, and the consul kindly agreed to go back with me and the soldiers to Jericho in the morning.

*Wednesday, September 1st.*—The consul having duly come to the hotel, we started at eleven o'clock; and I took with me a Greek belonging to the hotel, who had been two or three years at sea. We found our Turkish soldiers very slow in moving, and before we had travelled an hour and a half they stopped at a fountain to rest, so that we did not arrive at Jericho till half-past five.

The two Arabs had succeeded in bringing the boat down the river; she was now at Jericho; but they had fallen in with more Bedouins, who, finding that there was nothing in her worth taking, had allowed her to pass. Soon after our arrival we dispatched through Mustafá (the Agha of our soldiers) two Bedouins belonging to the country to the place where I thought there was most chance of getting some tidings of our lost men, and we employed ourselves in finding out all we could about the men who attacked the boat, their names, tribe, &c., and made arrangements for sending the particulars to the Pasha of Damascus. The Prussian consul, Dr. Schultz, came from Jerusalem to see if he could be of any service, having heard of our misfortune, and pitched his tent near ours. I received through Mr. Finn this morning a letter from Captain Symonds, stating that he purposed leaving Beirout on the 3rd, and hoped to be at Jaffa on the 6th of September.

*Thursday, 2nd.*—Being Ramazan, we could not get the Turkish soldiers to make a start till after their midnight meal; at one, however, they turned out, the drummers, with their two small kettle-drums at their saddle-bow, sounding the call to mount. The moon was well up, and by its light we rode through the stones and prickly bushes of Jericho, putting the guide who accompanied us the other night in front. Besides him there were sixteen soldiers, the English consul and his man. Toby and myself—quite a little army. We passed over the same road which Toby and I had traversed the other night, but at a much quicker pace; and as we passed the ravines and places of concealment I always sounded a railway-whistle, which the men would have recognised at a considerable distance. We rode on till sunrise, yet no signs of our lost

men; and about seven o'clock, having ridden fast, we reached the upper ground near which we had commenced our retreat. For some time we continued to rove about the sand-hills and over a considerable space of ground, occasionally making inquiries of the old women and boys who were burning weeds in the ravines, till at last the Agha said it was impossible to go further; the horses were already suffering, and he must return to Jericho. We therefore made one more circuit among the mountains, and commenced retracing our steps from the place where I had last seen my poor men. We met several people, to each of whom we promised a good reward should they bring the men, or any information respecting them, either to Beirout or Jerusalem. This was all I could do; and, under a broiling sun, and much distress at our failure, we rode back to Jericho, having been twelve hours on horseback, riding fast, and almost without dismounting, so that some of the soldiers were much exhausted before they reached the spring at which we had stopped on Monday night. Soon after one we reached our tent outside the castle, and I began to think what should now be done under existing circumstances. The boat had arrived, and we had everything at hand except, alas, the men. Had they been present I should have at once embarked on the Dead Sea; but all interest in our original project was lost until I could hear of their safety. Yet I could not help flattering myself that they were safe; for as the Arabs had not attempted to injure them personally, there were great hopes that they had struck across the mountains for the coast; and as I had constantly shown them our track on the map, there was every reason to suppose that they were well acquainted with its position. If I could have ascertained that any bodily evil had really befallen them, I should at once have returned to the coast; but as I did not despair of their safety, I hardly considered myself justified in doing so. On the other hand, I was in such a desponding and gloomy mood that I had no energy to undertake any enterprise. Yet, should the men have happily reached the coast in safety, I should for ever reproach myself, after vanquishing so many difficulties, and getting the boat and everything necessary to the very point, if I threw away the opportunity and returned without accomplishing anything. In short I knew not what to do.

At eight o'clock the Agha came into our tent and inquired about my future proceedings. I told him that I proposed sending the boat down the river in the morning, and if he would give me the soldiers promised by the Pasha, I would ride down with them and Mr. Finn as early as possible to the mouth of the Jordan, and then decide whether it was prac-

licable to go afloat or not. If I found that I was obliged to give up the matter for want of men, or from any other cause, I should at once put the boat on the camels, and return to Jericho; otherwise I intended to pitch the tent at the mouth of the river, and leave it standing in charge of the guard till I came back with the boat. To this arrangement he consented, and promised to be ready by sunrise. After drinking some tea and smoking sundry pipes and narghilés, Mustafa retired into the castle to sleep.

*Friday, 3rd.*—Notwithstanding the Agha's promises, I was unable to get him out of bed till long after sunrise; so in the mean time I dispatched three men to take the boat from the place where she lay, abreast of Jericho, down to the mouth of the river, and then I sent the baggage and all the boat's gear there in charge of one of the soldiers. At eight o'clock the Agha made his appearance, the kettle-drums were sounded, about a dozen soldiers mounted their horses, and we all proceeded to the post. On our way we passed the ruins of an old Greek monastery, near which there is a spring of good water; and in about three hours and a half we reached the mouth of the river, where I was glad to find the boat at last floating on the sluggish waters of the Dead Sea. We had great difficulty in getting anywhere near the shore, on account of the marshy nature of the ground, several horses and mules having sunk up to their bodies in the mud; but at length we pitched the tent on a small patch of sound but sandy ground.

Having now made up my mind to make the attempt along with Toby, the guide we had brought from Tiberias, and the Greek whom I brought down from Jerusalem, we quickly prepared for embarking; and Mr. Finn and the Agha at 5 o'clock left me, taking with them all the soldiers, except two that were left to take charge of the tent. By 6 P.M. all was embarked; and, after spending a short time in cleansing ourselves from the mud, we shoved off from this vile place, just as it was falling dark, with only two oars, and with no one who had much idea of using them, except myself, or any notion of boat-sailing. Under these circumstances, as I made sail and lost sight of the northern shore, I could not help feeling that I was embarked in a silly if not a perilous undertaking. The breeze gradually freshened till there was quite sea enough for such a little craft; but I continued to steer about S. by W. till 2h. 30m. A.M., having passed several large patches of white frothy foam; and, as the sea made an unusual noise, I was many times afraid that they were breakers.

*Saturday, 4th.*—At half-past two, thinking we must be approaching the southern end of the sea, I hauled to the wind,

and stood over towards the western shore. As daylight broke I found myself about 5 miles from the S. peninsula and about 2 miles from the cliffs which bound the sea to the westward. The breeze then died away, and by 7 o'clock it was calm. The sun had for some time poured its rays over the tops of the eastern mountains into this misty furnace, and we all felt very much as if we were in a well-heated oven. From Rás-el-Feshkah, at the northern end of the sea, nearly down to the peninsula, the western hills rise almost like a perpendicular wall to the height of 1200 or 1500 feet; and in one small gap only about Engiddi was there the slightest sign of vegetation in the ravines which seemed to betoken the presence of water. But I did not attempt to land, the heat being too intolerable, and having been strongly recommended not to do so, as the Bedouins occasionally approach the shores. The mountains on the eastern side are considerably higher than those to the westward, but slope down more gradually to the water's edge, and are broken by many large wadys or ravines. They much resemble some parts of the mountains of Lebanon, only they are more completely barren and scorched. Having taken a good look round, I stood off a little farther from the western shore; and when we reached the point where I thought the deepest water was to be found, judging from the formation of the land, I took a cast with the deep-sea lead. The extremes of the peninsula bore by compass about S.S.W. and S.  $\frac{1}{2}$  E.; Mount Quarantana barely clear of Ras-el-Feshkah bore due N., and the farthest land visible at the N.E. end of the Dead Sea bore N.N.E. We paid out all the line, amounting to 225 fathoms, without feeling sure that the lead had reached the bottom; but it was no easy task to haul it up again, so insufferable was the heat, although we contrived some shelter from the sun by means of our coats and blankets. When the lead was up, we found some pieces of clear rock-salt adhering to the *arming*.

Soon after this a light air sprung up from the southward, in direct opposition to our course; which, added to what I had seen of the sea during the previous night, induced me, very much against my wishes, to give up all further attempt to reach the peninsula; and I therefore allowed the boat to drift gently to the northward, endeavouring to keep near the middle of the sea. The peninsula extends at least two-thirds across the sea. The cliffs which bound it have a whitish appearance, but are of no great height; they resemble those I had seen in the valley of the Jordan, and are not unlike parts of the island of Gozo. The water throughout was of a dirty sandy colour, like that of the Jordan: it appeared to be destructive to everything it touched, particularly metals; it had also a dis-

agreeable smell, and produced a very unpleasant greasy feeling when allowed to remain on the skin.

At 11 A.M., when the eastern point of the peninsula bore about S.  $\frac{1}{2}$  W., the N.E. point of land N. by E.  $\frac{1}{2}$  E., and Mount Quarantana about N.  $\frac{1}{2}$  W., I sounded a second time, in 178 fathoms, and the lead brought up a quantity of dark clay or mud. The eastern hills about Ras-el-Taflah, abreast of which point we were drifting, are peculiar, the different starta being distinctly marked.

About 1 o'clock, Ras-el-Feshkah bearing N.N.W., Jericho due N., and the south-western point of land visible S.S.W.  $\frac{1}{2}$  W., we sounded the third time, and the lead came up covered with bluish mud, some of which I scraped off and kept. The depth was 183 fathoms. It now again fell calm; and by the time we had got in the line, we were all completely knocked up. At 3 o'clock we endeavoured to pull a little; but we made such miserable work of it, and the boat leaked so much, that everybody began to despair of getting back. At 5 h. 20 m. a breeze sprung up from the N.W., gradually drawing to the northward and freshening considerably; but the sea also got up so rapidly that the little boat took in much water, and we began to think what should first be thrown overboard, for she was too deep. Being unable to fetch along the eastern shore, about 6 h. 15 m. P.M. we went about, and spent a most wretched night endeavouring to hold our own by occasionally pulling a lee oar during the lulls.

*Sunday, 5th.*—We continued on the starboard tack the rest of the night, and at daylight found ourselves about two miles from Ras-el-Feshkah, having lost sight of the peninsula. The wind had fallen, and I was very anxious to sound again, but found it impossible, as no one could keep his head up, and even Toby was so chilled that I was obliged to give him some brandy. We managed to keep gently pulling against a light air from the north-west. At eleven o'clock we got sight of the tent; and at twelve we reached the shore, quite done up, and thankful for having escaped, which none of us expected to do the night before. Everything in the boat was covered with a nasty slimy substance; iron was dreadfully corroded, and looked as if covered in patches with coal-tar; and the effect of the salt spray upon ourselves, by lying upon the skin, and getting into the eyes, nose, and mouth, produced constant thirst and drowsiness, and took away all appetite.

As to the alleged destructive effect of the Dead Sea on birds flying over its surface, we killed some which were actually standing in the water; and on Saturday, while in the very centre of the sea, I three times saw ducks, or some other fowl,

fly past us within shot. I saw no signs, however, of fish, or of any living thing, in the water, although there were many shells on the beach. I must here mention a curious broad strip of foam which appeared to lie in a straight line nearly north and south throughout the whole length of the sea. It did not commence, as might be supposed, at the exit of the Jordan, but some miles to the westward, and it seemed to be constantly bubbling and in motion, like a stream that runs rapidly through a lake of still water; while, nearly over this white track, during both the nights that we were on the water, we observed in the sky a white streak, like a cloud, extending also in a straight line from north to south, and as far as the eye could reach.

Three remarkable points of land project from the eastern shore into the Dead Sea—Ras-el-Balkah, Ras-el-Tafilah, and Ras-el-Kerah—but I only observed one cape worthy of notice on the western side, viz. Ras-el-Feshkah, near its northern extremity. The cliffs are everywhere nearly perpendicular; and the tops of ten other ranges of hills and mountains may be seen rising behind them; but we saw neither buildings nor ruins on any part of its shores. At the northern end of the sea the water shoals gradually, and has a filthy, muddy bottom, at least in the neighbourhood of the Jordan. Farther to the westward we found a beach of shingle, covered with a greasy salt crust.

As soon as we reached the shore we took all the things out of the boat, and during the day packed up, ready for a start; after which we lay down, and had a comfortable sleep.

*Monday. 6th.*—At daylight we began to move, but the ground about us being much too bad for the camels to carry the boat, we put the tent and baggage on the mules, and two of the men having tracked the boat about two miles along the shore to a more convenient place to put her on the camels, we there hauled her up. As we rode along the beach to that place we saw a man following us, waving a handkerchief, and occasionally firing his pistol; so we pulled up to await his arrival, and to my inexpressible delight it proved to be the consul's Janissary, with a letter to tell me that the three lost men had reached Tiberias in safety; and he brought me also a most kind letter from Captain Symonds, enclosing a copy of the account that they had given him of their adventures. It would be a mere waste of words to state my joy at these tidings.

It was nine o'clock before we started the boat and the camels, and we then found considerable difficulty in getting her up the ravines and sand-hills to the plain on which stands the present village of Jericho, which the Arabs call Riha. On our arrival at that place we pitched the tent under some trees not far

from the old castle, and about five o'clock, while writing, I heard some horses galloping; and, running out, I was surprised and gratified beyond measure to find Curtis and Greaves, who had ridden up from Jaffa, and had come with Mr. Finn from Jerusalem to see me. We all dined in the tent, and spent a most jolly evening.

*Tuesday, 7th.*—About half-past seven, leaving Toby to bring on the boat, I pushed forward to Jerusalem in order to procure further assistance. I arrived there at 3 P.M., and lost no time in sending to him some fresh camels and six swarthy Arabs, for all which I had to pay 80 piastres. But it was not till 2 P.M. on

*Wednesday, 8th*, that he and the boat entered the walls of Jerusalem by the Damascus gate. In the mean time I went with the consul to wait upon the Pasha, and to thank him for all his civility.

*Thursday, 9th*, was passed in bargaining for camels to carry the boat to the sea-coast. On the 10th we finally left Jerusalem, and after two days I had the pleasure of finding myself once more on board H.M.S. Spartan, and of rejoining my three lost comrades.

XI.—On *Eastern Africa*. By Lieut. BARKER. (Communicated by Mr. M'Queen.)

[Read 8th May, 1848.]

THE islands of Mushakh having been purchased for the British Government from the Sultan of Tajourah, I had the honour of taking possession of them, in the name of Our Most Gracious Queen, on the 31st of August, 1840.

These islands are situated on a coral reef lying in a direction N.E. and S.W., 7 miles by  $3\frac{1}{2}$  miles N.W. and S.E., consisting of one elevated about 30 feet above the sea in the highest part, with a few trees scattered about them, such as the mangrove, but not a drop of water. The N.W. end of the N.E. island is situated in lat.  $11^{\circ} 43' N.$ , and long.  $43^{\circ} 19' 29'' E.$ , allowing Bombay to be in long.  $72^{\circ} 54' 26'' E.$ , variation of the compass  $5^{\circ} 30' W.$  There is a tolerable anchorage to be found in from 9 to 6 fathoms, muddy bottom, in a gap of the reef N.  $39^{\circ} W.$ , more than half a mile from N.E. end of Mushakh. Nearly in mid-channel there is a small rocky patch, having only 9 feet water. The soundings on this anchorage they have omitted in the printed chart. The rise and fall of the tide on the full and change of the moon, is 7 and 8 feet. The tides are, however,

very irregular, being much under the influence of the prevailing winds. Time of high water 7h. 15m. A.M.

Tajourah has been sufficiently described by Sir William Harris. I must point out, however, another error—in the map lately constructed, where there is 16 fathoms water, they have put down two small islets surrounded by a reef!

Joobul Kharib, situated at the head of the Bay of Tajourah, is worthy of a short notice from its extraordinary formation. The whole of this portion of Africa has evidently been subject to violent volcanic agency. This bay is connected with the Bay of Tajourah by two narrow channels. The whole width across from coast to coast being about three-quarters of a mile, with a small rocky isle, 40 feet high, situated rather nearer to the Dannakil than to the Eessah coast; the channel formed between it and the former being but 40 yards wide, having 17 fathoms, and the other about 350 yards, having but 3 fathoms on its rocky bottom. The bay lies in a direction N.W. by W. and S.E. by S., 13 miles by nearly 6 miles broad. The western portion is decidedly volcanic. The northern and southern sides are formed by precipitous limestone cliffs, from 400 or 500 feet to 2000 feet above the level of the sea, with very deep ravines. In the S.E. portion the water is deepest, there being 115 fathoms, with the shore equidistant to the northward. Just three-quarters of a mile, a line of soundings across the centre gave 105 fathoms.

In the western extremity there is a small basin, having 16 fathoms water in it, about 300 yards in diameter, surrounded by precipitous volcanic cliffs; the entrance is closed at low-water. Having a small gig with me, I had it carried across this barrier, and sounded all round the basin. Large masses of lava abound in this part of the bay. At a short distance from the small basin there are two islands called Good Alli; they are both precipitous: in one the traces of the lava, or the course of it rather, is plain; the other is of a reddish-white appearance, being thickly covered on all sides with some vegetable matter and earth mixed together.

There are so many reefs and dangers in the vicinity of Zeylah, that it is difficult to give a clear description of the place. The harbour is bounded on the west side by a range of sand-banks extending from Ras Tacooshah in a N.N.E. direction towards Taddickdeen Island, having three channels for small ships, each about 300 yards wide, 18 feet at low-water.

Zeylah is the only port on the Eessah coast. It is built on a low sandy cape called Ras Mahmahr. It has a wall round it in a very ruinous and dilapidated condition; there are a few

stone buildings and about 200 huts. At the time I visited it, it was a dependency of Mocha. The Governor generally resided at the latter place; his deputy governing for him, with a guard of about 30 Arab soldiers armed with matchlocks and shields. They have four or five very ancient guns. The people are supplied with water from the bed of a watercourse situated about 4 miles to the S.W. of the town, called Ta-cooshah, where there is a small round tower, and a guard of five or six Arab soldiers to protect the watering-place. They have an old iron gun, made of bars of iron hooped together. There are some few Arab merchants residing in the town, and some few of the Eessah Goodoo-boorie Somaulis. These people are not allowed to enter the town with their arms, depositing them at the gate.

From October to April, which is the rainy season, the coast from Goobul Karab to Core Kurangarub, called by the natives Bhurt Eesal or Eesaulie, is inhabited by wandering parties of the Eessah Somauli, who return to the interior as soon as the pasturage becomes scarce on the approach of the dry season. They are a very powerful tribe; said to be like the sand of the sea-shore for multitude; and are much feared by the Dannakil, who inhabit the opposite side of the Bay of Tajorah, extending along the western shores of the Red Sea to Howakil Bay. These latter people describe Eessah as a race of treacherous thieves and murderers. As far as my experience goes, I found them a timid and inoffensive race.

They are professedly Musselmans, but do not appear to know much of the religion they profess. They lead a wandering life, dwelling not in towns or fenced cities, but roving about from place to place, wherever they can find pasturage for their flocks and herds. It is only a few of them that wear any clothing; most of them, both males and females, wearing a kind of leathern apron. They are armed with spear and shield, and also bow and arrows. They are said to be very expert in the use of their arms, more particularly the latter. The bow is formed of a very tough kind of wood, with but little spring in it; the spring being in the string, which is made of the entrails of sheep or other animals. The arrow is but 14 inches long, made of a reed very nicely feathered and balanced, with an iron barbed head; below the barb there is a small ball of poison; the head of the arrow is fitted so slightly into the reed, that it immediately becomes detached from the reed on striking any object, thereby rendering it difficult to extract. With these arrows they slay the ostrich, zebra, and indeed all kinds of animals.

They are very partial to red hair, dyeing it of that colour,

and are very particular in dressing it. Those who are not favoured by nature with good heads of hair make wigs of sheep-skin, dyeing them their favourite colour. I bought one of a man, who was trimming it by the road-side, for one dollar. They never wear the turban, or indeed head-dress of any kind. They only who frequently visit the coast know the value of money. They are, in common with other savage people, very fond of ornaments and trinkets. The produce of their country—consisting of hides, ostrich feathers, horns, ghee, or clarified butter, gums, &c. &c.—are brought to Zeylah, and there exchanged for trinkets and blue cloth (cotton of a very common kind), made at Surat and other parts of India.

Their chief is called Oogass, and is much respected. The title is, I believe, hereditary.

I know not of any rivers in their country; neither could I obtain any satisfactory data as to the extent of their country, except that it extends to the kingdom of Hurrurh—about which more anon.

While I was at Zeylah, in November, 1840, I saw a small caravan or cafila, as it is called here by the Goodoo-boorrie Somaulis, consisting of about 25 men and several women, with some few children. They had come to Zeylah to exchange the produce of their country, the same as that of the Eessah, for grain, blue cloth, &c. They gave me a description of the ruins of an ancient town, which they called Harrowah, nine days' journey to the S. of Zeylah. This must not be confounded with Hurrurh, which they also knew.

Berberah is the principal place of trade along the coast, on account of its beautiful harbour, which is formed by a curvature in the coast-line, and a low sandy cape, projecting out nearly at right angles with the general line of coast, to the distance of  $1\frac{1}{2}$  mile nearly. The extreme of this sandy cape is in lat.  $10^{\circ} 26' 20''$  N., and long.  $44^{\circ} 6' 20''$  E. At the entrance the harbour is  $\frac{1}{2}$  of a mile wide, with 13 fathoms mid-channel; direction of the harbour E.N.E. and W.S.W., gradually contracting and shoaling to five fathoms, within about 200 yards of the town. The tribes from the interior commence arriving about the end of October, and continue to do so till March. At the end of that month, in a few days, the place, from containing a population of 10,000 or 15,000, becomes totally deserted. About the time that the tribes commence to assemble, boats also from India make their appearance, as well as from the several ports on the coast of Arabia and from the Gulf of Persia. The imports are white and blue cotton-cloths of Indian manufacture; also piece goods, Indian handkerchiefs, brass and copper wire, zinc and

beads, dates and grain from the coast of Arabia, and some few prints for the Hurrurh market. Some English shawls I saw there were valued at 20 to 30 German crowns each. The exports are ghee, hides, deer's horns, ivory, gums, ostrich feathers, coffee, sheep and horned cattle.

I learned from several individuals that the ancient name of the coast, now called "Bhur Hebrawal," was "Bhur Eesakh," who was the father of the Somaui. He dying, left three sons, Aboo-ghur-hajiz, Hebrawal, and Aboo-teezaylah. The latter's mother was a slave. From these three are descended the numerous tribes of Somaui, the principal of whom are the Ayal Aboo-ghur-hajiz, Ayal Hamed, Ayal Gudeed, Ayal Shoor Drooan, Ayal Hosha, Ayal Mahomoad, and Ayal Grums. I could not obtain any information as to the strength of each tribe. In former years they inhabited the coast from Meeat, in the vicinity of Mette Island, eastward, to Cape Guardafui, and along the east coast of Africa towards the equator; but as the Galla, who then inhabited this part of the coast, retreated towards the interior, they occupied their places.

Like the Eessah, they lead a wandering life, halting from time to time at such places as they can obtain pasturage for their flocks and herds, in which they are said to be very rich. I do not think that they have any rivers of importance in any part of their country.

They profess the Mohammedan religion, but have but an imperfect knowledge of its tenets. I was too short a time with them to obtain any knowledge of their language, further than that it has not the slightest resemblance either to the Arabic, Amharic, or Hurrurhje (or that spoken by the Hurrurh people). Each tribe is governed by its own chief, somewhat after the patriarchal manner. The men, as well as the women, are tall, and of pleasing manners.

From Berberah the coast extends with a slight curve to the southward, towards Sayaral, on a line of bearing E.N.E. At Sayaral there is a tolerable anchorage in an open roadstead, 10 fathoms, about  $\frac{1}{2}$  a mile from the shore. Good water may be easily obtained from a few small wells situated about 60 yards from the beach. The water at Berberah being very brackish, the inhabitants are supplied from this place; but a more unpromising place for water I have never visited—a barren, sandy soil, not a blade of grass to be seen in any direction, and in some parts the adjacent hills are covered almost to their summits with drift-sand. There is a very extensive burial-ground, but no inscriptions of any kind, and the ruins of a mosque. Tradition says that in former times there was a con-

siderable town here. Sayaral is in lat.  $10^{\circ} 35' 26''$  N., and long.  $45^{\circ} 22' 56''$  E. There are two rude stone buildings and five or six huts.

There is great difficulty in obtaining any information of the interior, either from the natives of the country or its inhabitants: no reliance can be placed on what the natives say, and there is great difficulty in getting to the interior, owing to the jealousy of the people.

Hurrurh may be said to be situated about 192 miles to the eastward of Ankobar, and about 150 S.S.W. from Zeylah. It is situated in a verdant valley, almost encircled by hills. It has a wall round it, of stones and mud, which is kept in good repair: the height thereof is 12 feet, and thickness 3 feet, and in circumference about 2 hours' quiet walking. There are five gates—Emá-e-deen Burri (which means gate), facing towards Shoah; Siektal Burri, towards the Arroosie Galla; Budderoo-Burri, towards the Alla Galla; Assoom Burri, towards Zeylah; Argoboh Burri, towards Berberah. The Galla approach near to the town on all sides, and N. towards the W. the Nooli Galla; W. towards the S. the Alla Galla (these are two powerful tribes, mostly pagans); to the N.E. dwell the Beero Galla, who are Mahommedans; and to the E., and thence towards Berberah, the tribes of Jarsoo, Babili, Bursoob, Burtera, and Gooti Galla, many of whom are said to be Mahommedans. The ruler of Hurrurh governs with the title of Emir. The present Emir's name is Aboo Beker: he has reigned seven years. The succession is hereditary, as is the case in Shoah. The male relatives of the reigning prince are all confined. It is said they are shut up in vaults, from which they are but seldom allowed to remove. Should the prince, however, at any time need their services, they are released, and frequently on such occasions preferred to situations of great trust. On the slightest suspicion, however, that they are plotting against the government, or should they become too popular, they are speedily sent back to their vaults again. The soil in the vicinity is very rich, producing coffee, wheat, barley, jowarie, &c. in great profusion. They have also a great variety of fruits and vegetables. Coffee is the most important export.

They have a small copper coin called mahalah, twenty-two of which are equal to a nominal coin called ashreeffi; forty ashreeffi are equal to one German crown. The mahalah resembles the small copper coin used about Jeddah: on the one side is written in Arabic characters "there is no God but God," and on the reverse the name of the reigning prince. Cafilas are coming from and departing to various quarters at all seasons. The principal are those that trade to Berberah, Zeylah, Chercher,

and Arroosic. There are smaller cafilas that trade to Arreea, Ogahdeen, and other parts of the Somauli country. Hence cafilas trade yearly to Berberah between the months of October and March, occupying from 30 to 40 days on the road. Camels are used for the journey, laden with coffee, ivory, ghee (clarified butter), ostrich feathers, gums, &c., and slaves, both male and female, are also exported to Zeylah as well as to Berberah. In return they receive blue and white coarse cotton and Indian manufactures, Indian piece goods, English prints, silks, shawls, red cotton-yarn, beads, zinc, copper, copper wire, &c.; and, from the Somauli country, frankincense and book-koor Somauli. The Hurrurh people are called "Hurrurhji," and also "Hurrij." They are rigid Mohammedans, paying strict attention to the fasts and ceremonies enjoined by the false prophet. Their language bears some affinity to the Amharic. They use the Arabic character. The climate resembles that of Alio Amba, which is 3000 feet below Ankobar. Hurrurh possesses advantages that certainly no other town on this side of Africa has of penetrating to the interior.

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XII.—*On Eastern Africa*. By Lieut. CRUTTENDEN, I.N. (Communicated to Mr. M-Queen by Sir Wm. Harris, Political Resident, Aden.)

[Read 8th May, 1848.]

THE Bur e Somal, or Somali country, properly speaking, extends from Ras el Khyle, on the eastern coast, to the Esa tribe, who reside in the neighbourhood of Zeylah. The people of Mukdeeshah are not Somalis, but of the Haweea tribe. The river usually known as the Webbe forms their southern boundary, or, as they express it, is "the separation of the Moslemin from the Kaffirs" (under which common term they include English as well as Galla). The country, as you proceed to the westward from Cape Jered Hafoon, changes in its productions. Coffee in great abundance is found in the mountains of the Gidr Beersi, but no gums; whilst to the eastward the coffee vanishes, and the hills produce so great an abundance of gums that the "*regio thurifera*" ought, properly speaking, to be looked for there, rather than on the plains of Morebat and Háseh.

The Somalis, especially those who live on the coast, are fond of dating their origin from the Arabs. By their tradition, Sheikh Isaakh, an Arab chief of great sanctity, settled on the Somali coast near Mette, and, marrying a female of that place, became the father of the Habr Awal, Habr Gerhajis, and

Habr't el Jahleh, which three tribes extend from Mette to Jibel Elmiss in the present day. To the eastward of Mette we find the warlike tribe of the "Wursúngeli," which name means "has brought good news" (it is spelled in the chart Oor Singali, which is incorrect), and thence to the eastward round Cape Jered Hafoon, and down to Ras el Khyle, the country belongs to the numerous clans of the Mijjertheyn. These are the tribes on the coast. To the southward we find the country of Murreyhán, and next in succession to the westward the tribes of Dulbahanti, Burtirrhi, Abbaskool, Ghirri, Gidr Beersi, and Eesa, whilst the Bheer Whallea tribe inhabits the banks of the Webbe, and the province of Ogáhdén fills up the space between them and the Haweea, who reside on the bend of the river and on the coast of Mukdeeshah. This river Webbe, which takes its rise in Gurague, pursues, as far as my accounts go, a different course to that usually laid down for it. After leaving the country of the Bheer Whallea, it flows *more* to the E.N.E., and approaching near the sea some two days' journey to the N.W. of Mukdeeshah, takes a sudden bend to the S.W., and passing that town at 6 hours' distance, is finally absorbed in a marsh a little below the latitude of Brava, and about 6 days from the sea. Annual expeditions are made by the Mijjertheyn and Wursúngeli to the river, where they purchase ivory and myrrh with cowries, which they bring with them from Zanzibar.

From Ras el Khyle to Berbera, the Wadi Nogal extends in almost a straight line between two ranges of mountains. The "happy valley" is spoken of in the most glowing terms by the natives, and apparently forms their great road for trade. The people of Ogáhdén, Murreyhan, &c., bring all their gums, ivory, and ghee along this valley, as being the safest and least fatiguing route, and the people are described as a peaceful race, who subsist chiefly by the chace, and by their sale of ostrich feathers, myrrh, and ghee.

This valley would form an advantageous starting-point for a traveller, nor do I apprehend any particular danger. In a commercial point of view the Mijjertheyn and Wursúngeli territories are the most valuable, and I consider that a small vessel of 300 or 400 tons might with ease procure a cargo of gum arabic, luban, and myrrh, at any of the bunders belonging to these tribes. The fact of upwards of 800 tons having been exported during my stay of 7 months on that coast, from three ports alone, sufficiently attests the abundance of the article, and in some measure may account for the rapid fortunes accumulated by the Banians, in whose hands alone does this trade lie. Arrangements should be made with the mer-

chants on the Somali coast before the commencement of the foul weather, say the month of April, to have a cargo ready for the vessel by the 1st of the *Now-Rúz*, or about the 28th of August. The coast is then approachable, and the gums could be shipped off at Bunder Murayah, Bunder Khor, and Bunder Zeeada, or Bunder Ghasin, with but little delay. It is to be earnestly hoped that English enterprise will open this trade before long. The name of an Englishman is much respected by the natives, and they make a marked difference between them and any other nation. Promises of all kinds were made to me, that they would give every facility to the English merchant who would bring his wares himself amongst them, and who could thus afford to sell them cheaper, and one or two offered to guarantee a certain supply annually if arrangements were made in time. It would be useless, however, sending out a vessel without some person who understood the character of the people, and who could converse in Arabic with them without the aid of an interpreter.

To the westward of the Mijjertheyn hill, the Wursúngeli range, 4000 feet high, affords an inexhaustible supply of frankincense, though but little gum-arabic, and no myrrh. The climate on these mountains is described as most invigorating, and the country abounds in large game, the lion being very common in these parts.

Westward of the Wursúngeli the gum-trees become scarce, and though there are some parts having considerable trade throughout the year, all their gums are brought from the Dulbahanti and Ogahden tribes. Sheep form the chief article of export from Kurrum westwards, and the countless flocks that are driven down almost daily and shipped off for the Arabian coast exceeds belief. Berbera is of course the greatest mart at one season of the year, as all the tribes collect there, but an English vessel would do but little when placed in competition with the Banians, whose cargoes are, generally speaking, engaged the season before. I may here mention as a proof of the peaceful nature of the country, that frequently the Banians go for 20 days' journey inland, for change of air, and are allowed to live unmolested. I would not, therefore, advise a vessel to go to Berbera to trade, but endeavour to be off the sea ports to the eastward as soon as ever the season opens. The gums are then all packed in readiness for shipment, and but very trifling delay would occur.

To the westward of Berbera there are no trading ports until we come to Zeylah, where doubtless a vessel would get a valuable cargo of coffee and mules; but I fear much time would be lost. But a small quantity of gum is brought into

Zeylah—coffee, dye, and ghee, with ivory in small quantities, and ostrich feathers, form the articles of export; and though probably the present ruler, Sheikh Sherwarkhi Ali Saleh, will by his wise form of government eventually open the trade to Hurrur, it is a thing to be looked forward to, and does not exist at present. I should average the quantity of gums exported from the Somali coast at 1500 tons, though occasionally, after a good season, I believe that the Mijjertheyn tribe alone export nearly that quantity.

XIII.—*Remarkable Localities on the Coast of Epirus.* By JAMES HENRY SKENE, Zante. (Communicated by Mr. Greenough.)

[Read 12th June, 1848.]

*Chimerium.*

AFTER the defeat of the Corinthian naval force by that of Corcyra in the year 435 B.C., we read that the fleet of the former lay in the harbour of Chimerium, on the coast between the mouths of the rivers Acheron and Thyamis, and that the fleet of the latter was anchored at Sybota. The hostile forces are stated to have thus remained during a whole summer without meeting in battle;\* and that three years afterwards also these respective fleets again occupied the same stations.† Chimerium is here described by Thucydides as being in the Elaiatis, and dependent on the town of Ephyra. The best work on the topography of this part of Greece ‡ attempts to prove that Chimerium was Arpitza, although its learned author admits that there exist objections to this conclusion. He is obliged, for instance, to give a forced meaning to the word *ἐπίερα*, which is used by Thucydides to convey the relative positions of the town of Ephyra and the harbour of Chimerium; because Cape Varlam, which he supposes to be the Chimerian promontory, is, by his own avowal, 12 or 14 miles from the probable site of Ephyra. The bay also, which he considers to be the harbour, is described by himself as being “a retirement of the coast with a sandy beach:” now this would be but a poor station for a fleet during many months, as the place happens to be exceedingly exposed to violent winds and heavy seas from the north and west, without any kind of shelter whatever. Moreover, such a beach would hardly be called a

\* Thucyd., l. 1, c. 29 et seq.

† Ibid. l. 1, c. 46.

‡ Colonel Leake's *Northern Greece*, vol. iii. p. 5 et seq.

λίμνη or "harbour" by Thucydides, as that of Chimerium is. The same modern traveller mentions a place called Agio Janni, or St. John, not far from his supposed Chimerium, and he adds, that "it is the best harbour in this part of the coast," but without suggesting any ancient name for it, further than vaguely hinting that it may be the post of the ancient town of Buchetium. It cannot be supposed that so good a haven should have been overlooked by the ancients: and not only is there no apparent reason why this should not be Chimerium, but also there are strong appearances in favour of the idea that it is. First, Agio Janni is a harbour fit for a fleet to anchor in, and remain perfectly safe during a summer. Secondly, it is not more than a mile and a half distant from the supposed ruins of Ephyra. And thirdly, it is also between the mouths of the Acheron and the Thyamis. Therefore the description of Thucydides corresponds with Agio Janni; but there is a much stronger argument than these, and one which will, it is hoped, prove that this new topographical identity is correct.

I had occasion recently to sail into the port of Agio Janni in a small yacht, during a dark night, and blowing hard with violent squalls. In beating into the harbour I was astonished to perceive the sea become suddenly as calm as a mirror, although the wind was increasing, but the calmness lasted only for a moment, and had the appearance as if a few barrels of oil had been emptied over the waves in a particular spot. It was too late that night to make any investigation into the causes of this, but on the next morning I returned with a light breeze in search of the spot, and found a circular space of perfectly smooth water, the diameter of which might be about 40 feet; and it appeared to be raised above the surface of the surrounding sea. The water rose from beneath with such violence as to form a series of small circular waves beyond the ring diverging from the centre, which was turbid, and bubbled up like a spring. We steered across it, and found that the cutter's head swerved about as in a whirlpool, which convinced me that it was occasioned by a powerful submarine source, or perhaps the outlet of one of the Katabothra, or subterranean channels, which flow out of the lake of Jannina.

Now Pausanias mentions the fact of these phenomena existing on the coast of Argolis, and in Thesprotia, near the place called Chimerium, ἐν τῇ Θεσπρωτίδι κατὰ τὸ Χειμέριον καλούμενον.\* The modern topographer† above alluded to thus describes the Deine of Argolis in his travels in the Morea:‡—"This is a copious source of fresh water rising in the sea, at a quarter of a

\* Pausanias, Arcad., 7. 2.

† Colonel Leake.

‡ Vol. ii. p. 480.

mile from a narrow beach under the cliffs. The body of fresh water appears to be not less than fifty feet in diameter. The weather being very calm this morning, I perceive that it rises with such force as to form a convex surface, and it disturbs the sea for several hundred feet around. In short, it is evidently the exit of a subterraneous river of some magnitude, and thus corresponds with the *Deine* of Pausanias, who remarks, in the *Arcadics*, that the waters of the plain, in the *Mantinice*, called *Ἀγρὸν*, or the *Inert*, flow towards a chasm, and that, after a subterraneous course, they re-appear at the *Deine*, towards the place in the *Argolis* called *Genethlium*; "here sweet water," he adds, "rises out of the sea, in the same manner as near *Chimerium*, in *Thesprotis*." \* These two phenomena, therefore, strongly resemble each other, and they may well be mentioned by the ancient geographer as being similar. The modern geographer, in his travels in Northern Greece, † says himself that "if the remark of Pausanias were verified, who states that fresh water, similar to that of the *Deine* on the coast of *Argolis*, rose in the sea near *Chimerium* (that is, near *Arpitzá*, which he considers to be *Chimerium*), there would remain no doubt on the subject."

The circle of smooth water at *Agio Janni* being also fresh, it therefore appears to be proved that that harbour, and not *Arpitzá*, is the ancient *Chimerium*, and that the *Chimerian* promontory is consequently the cape which encloses it, and not *Cape Varlam*, as supposed by the author of the work just quoted. He concludes his argument on the subject of the *Deine* of *Argolis* with the following words, which may equally well be applied to *Agio Janni* and *Chimerium*: "The phenomenon itself is of too singular a kind, and answers too exactly to the words of Pausanias, to allow of any reasonable doubt of the identity." ‡

It is not without diffidence that I thus venture to start a novel opinion which is in contradiction to that of so distinguished an archæologist as Colonel Leake; but having chanced to discover a new datum on the subject, which, as far as I know, has not yet been noticed, I trust that a suggestion founded on it may not be considered presumptuous on my part.

The town of *Parga* stands nearly opposite to the small island of *Paxo*, which is one of the seven *Ionian States*; it is built on a rocky peninsula which separates two small bays, and which is so steep, that from the sea the houses almost appear to be

\* Paus., lib. viii. cap. 7.

† Vol. iii. p. 6.

‡ Travels in the Morea, vol. ii. p. 481.

constructed one above another. A strong, though small Acropolis, defends the town, rising on the summit of the rock like a mural crown, and the harbour is protected by a small fortified island. The country around is rich in picturesque attractions, and the land in the vicinity of the town is abundantly fertile; it boasts of 80,000 olive-trees, fruitful gardens, and groves of citron-bushes, yielding a considerable revenue, and the attachment of the Pargariotes to their native soil was justified by many other advantages sufficiently obvious to those who visit the spot. The produce of citrons, many of them growing to the size of a man's head, was exported to Trieste, and a part of it found its way even as far as Poland, where it was made use of by the Jews for their religious festivals.

The modern town cannot date more than four centuries back, as the ruins now called Palæo, or Old Parga, were occupied before that period. By some Parga is considered to be the Ephyra of the ancient Greek geographers, while others hold, with more apparent probability, that the latter town stood on the right bank of the Cocytus, where there is now a ruined monastery.

Parga offers greater coincidences with the data belonging to the ancient Toryne, or Torone, where Octavianus anchored his fleet when going from the Ionian Sea to the Straits of Actium in order to offer battle to Antony. It may also be Buchetium, which the Epirotic allies of the Roman consul, M. Fulvius Nobilior, selected as a safe place for the imprisonment of certain Etolians whom they had taken near Cephallenia.\*

This district was called Elaiatis from its riches in olive-trees, and the environs of Parga are still famed for their oil, but there may have been olive-trees near the Cocytus, now the Vuvò, where Ephyra probably stood. It was the town, according to Pausanias, in which Theseus and Pirithous were confined by Aidoneus or Pluto, king of the Molossi, after the failure of their attempt to carry off Proserpine. Saint Donatus is now the patron of this country, and it is curious that the common name given him by the peasants, *Ai Donat*, should resemble so much the name of its ancient king *Aidoneus*.†

About five miles to the south-east of Parga a much safer harbour invites the weather-strained bark, but a strong current flowing from it renders the access difficult, unless the wind is fair and strong. The entrance is narrow, being merely a gap between two lofty cliffs, but a wide and tranquil bay lies within: this haven, now called Porto Phanari, is considered to

\* Polyb., l. 27, c. 9 (l. xxii. Tauchn.).

† Leake's Northern Greece, vol. i. p. 234.

be the Glykys Limen of the ancients, and with much more appearance of authority than that which was brought to bear on the port of Gomenitza.

The river which falls into Porto Phanari, and creates the constant reflux at the mouth of the harbour, is consequently concluded to be the Acheron of antiquity: it waters a vast plain, on which there are several villages, and which formed a part of the Plutonian dominions. The descent of Orpheus to the infernal regions was probably founded on a journey to this country; and the spot from which he looked back, like Lot's wife, and lost his Eurydice, may have been somewhere on the hills of Soul, which he must have traversed. A stream which is tributary to the Acheron, and which is now called the Vuvo, is supposed to be the Cocytus; while a small lake through which the former flows, is identified with the Acherusia Palus.

The accurate Thucydides,\* when relating the course followed by the Athenian fleet from Leucadia to Corcyra, that is, from Santa Maura to Corfu, describes the river Acheron, the Glykys Limen, the Acherusian Lake, the Chimerian promontory, and the mouth of the Thyamis, in a manner which at once brings conviction with it, that these localities are the modern Porto Phanari with its environs, and the Calamas,† which proves that the Acheron fell into a bay small enough for the fresh water to diminish its saltness, which is the case with Porto Phanari, but not with the bay of Gomenitza.

The very ancient writer Scylax has the following passage, which illustrates and corroborates Strabo's topography of the Acheron: 'Ἐνταῦθα ἐστὶ λίμνην, ᾧ ὄνομα Ἐλαία· εἰς τοῦτον τὸν λιμένα ποταμὸς ἐξίησιν Ἀχέρων, καὶ λίμνη Ἀχερουσία, ἐξ ἧς ὁ Ἀχέρων ρεῖ ποταμός. The harbour is here called Elæa, but it seems to have borne that name before it was known as the Glykys Limen. Livy‡ also confirms these authors by a statement which is thought to have been borrowed from the lost books of Polybius: "et Acheronte amni quem ex Molosside fluentem in stagna inferna accipit Thesprotius sinus."

This proves at least that the Lake of Jannina could have nothing to do with the Acherontian regions, as Meletius thought, and indeed it is surprising that, with such a mass of contradicting evidence, he should ever have found any one to agree with him and to follow his errors. Ptolemy's description also corresponds perfectly with Porto Phanari, and Eustathius gives the same data in his Commentary on the tenth book of the Odyssey. Pausanias likewise agrees with all these authori-

\* Lib. 1, 46.

† Lib. 7, p. 324.

‡ Lib. 8, c. 24.

ties, and adds a testimony respecting the river Cocytus, which militates against the theory of that stream flowing into the Lake of Jannina, as none of those which do fall into it are remarkable for the taste of the water. He says, πρὸς δὲ τῇ Κιχύρῳ : λίμνη τε ἐστὶν Ἀχερουσία καλουμένη καὶ ποταμὸς Ἀχέρων ῥεῖ δὲ καὶ Κωκυτὸς ὕδωρ ἀτερπέστατον.\*

This epithet is fully applicable to the flavour of the stream which joins the river, whose mouth is Porto Phanari. Cichyrus is merely another name which was borne at a later date by the town of Ephyra. The Acherusian Palus, supposing the small lake to be it, is three miles long, and one and a half broad ; no pestilential vapour emanates from it, but malaria is common here, and the ancients, ignorant of the nature of the marsh miasma, may have attributed its effects to deadly effluvia emitted by the infernal lake. The name of Glykys Limen, or harbour of sweet waters, has been lost to the Porto Phanari, but it has been preserved, not far distant from it, in that of a village called Glyky. So many depositions combined must leave little doubt as to the identity of these localities, and must completely refute the pretensions of the plain of Jannina to mythological honours, unless indeed, and it is far from being unlikely, some future discovery may prove that, although it may not be the realms of Pluto, it is the favourite haunt of the Dodonean Jupiter.

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\* Pausan. Attica, c. 17.

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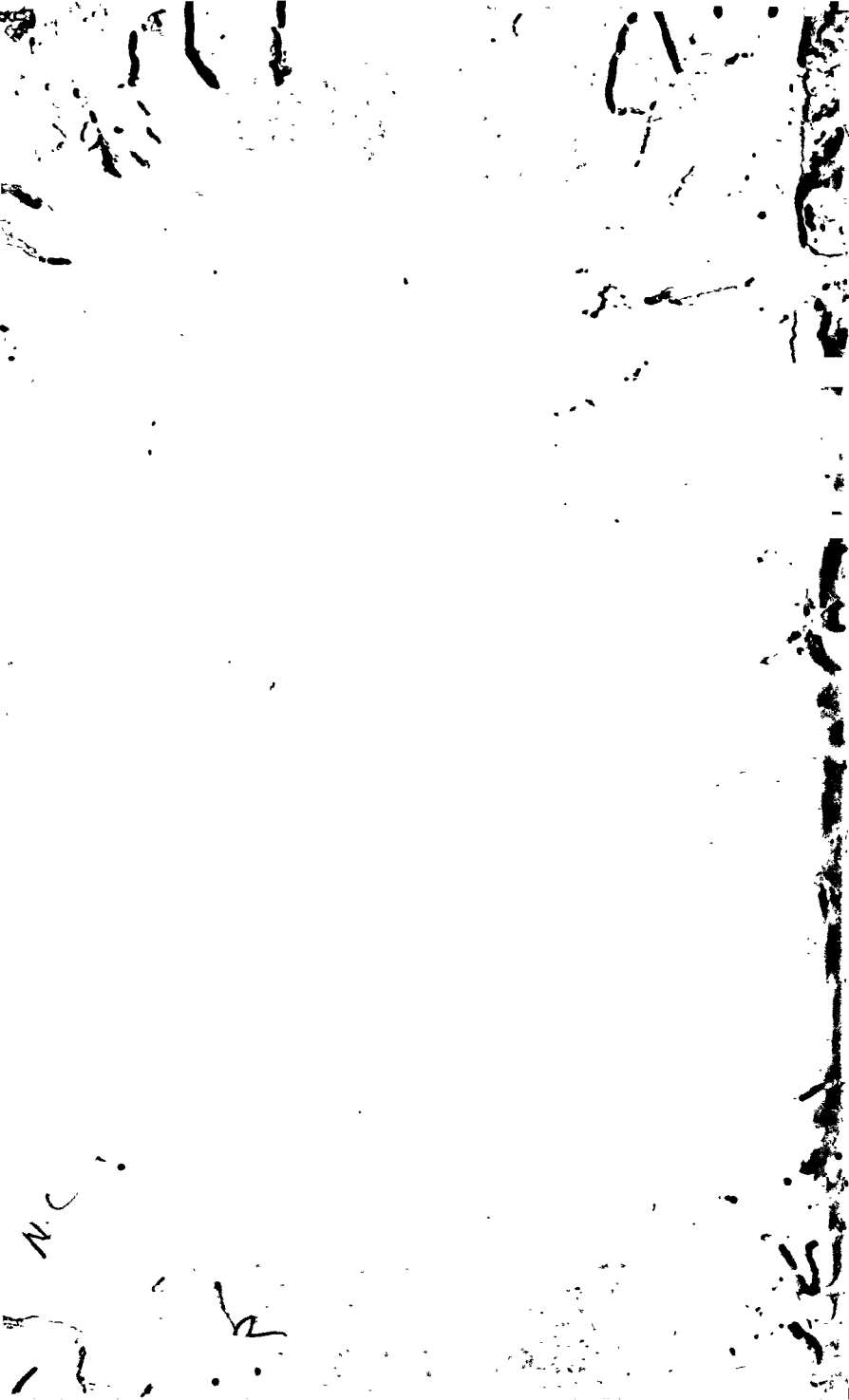
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